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BARASINGHA STAG WITH CROOKED AND SHORT ANTLERS IN KANHA MEADOW

—Photo by S. R. Choudhery.



Wild Life Preservation Society of India

1. The aims and objects of the Society are as follows

- (a) To promote interest in and impart knowledge regarding the preservation and conservation of all forms of wild life, particularly among the youth of the country.
- (b) To co-operate with the Govts. of India and States and with other Societies and Institutions having similar aims and objects in working for the interests of wild life.
- (c) To assist in enforcing and actively supporting the Forest Acts, Wild Birds and Animals Protection Acts and Rules etc. of States and the Indian Arms Act and Rules in so far as they pertain to wild life and to bring to the notice of the authorities any infringement of the same and to assist in the detection and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wild life administrators in the formation, maintenance and protection of Sanctuaries and National Parks, the preservation of wild life in general and rare species of India in particular and in the introduction of exotic species into the country, the rehabilitation of rare species etc. and in the revision on rational lines of the shooting and fishing rules, so as to conserve and increase wild life stocks.
- (e) To raise funds for the carrying out of the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wild life.
- (f) To promote sportsmanship in shikar and to recognise well regulated shooting and fishing, as a means of preserving wild life and fish so that through wise use the surplus may provide a recreational asset to the nation.
- (g) To carry out publicity and propaganda for the preservation of wild life in India by means of monographs, journals, films, film strips and other feasible methods.
- (h) To assist members of the Society in obtaining shooting and fishing facilities and facilities for viewing and photographing wild life in India.
- (i) To conduct research into the problem of Wild Life management in India, and in pursuance of this, to initiate, encourage and, where possible, assist in projects for the study of threatened species and related subjects and to provide reference and research facilities for such work.
- (j) To carry on such other activities which will serve the above subjects.

What membership of Wild Life Preservation Society of India will entitle you to ?

1. You will become an active member of the growing number of Wild Life enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of Wild Life for posterity.
2. You will be entitled to the full use of the Library of the Wild Life Preservation Society and of its reading room.
3. You will receive a membership certificate.
4. You will receive a personal Identification and Membership card.
5. You will be entitled to buy all publications of the Society at a concession rate.
6. You will be entitled to buy at concession rates the Society's Greeting Cards, Calendars, Tie, Lapel badge and the Balance of Nature Game (specially Published in colour for its educative and recreational value).
7. You will be supplied "Cheetal", the quarterly journal of the Society free.

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A REMINDER

Members are reminded that their subscriptions fall due on the 1st April every year.
The subscription rates have recently been revised—(Please see last page).

Wild Life Preservation Society of India

Vol. XIV

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No. 1

Editorial

Now that all the States have banned the shooting of tigers and panthers, it should not be difficult for them to check poaching of these two species, in particular. Anybody, particularly taxidermists and tanners in possession of skins of these two species should be liable to prosecution, if they are not in a position to prove that the skins had been obtained prior to the ban. But this control on taxidermists, tanners and dealers in skins and hides is not easy to enforce for the States must first have the legal right to do so. As far as we know, it is only the Bombay Wild Animals And Birds Protection Act which has the necessary provisions to allow the inspection of taxidermists, tanners and dealers factories and shops. It was some years ago that the Indian Board for Wild Life recommended that other States also promulgate a similar law and rules thereunder. If this is not done, the ban on shooting of tigers and panthers would result in banning legitimate shikaries and encourage illegal killing of these two species. Poachers could work at their nefarious activities without fear of disturbance from genuine shikaries. Reports received from States, West Bengal in particular, indicate that skins of tigers and panthers are available in large numbers,.....for a price, of course ... for export. The ban would thus have succeeded in raising the market price of the skins. It is, therefore, imperative that the States take immediate positive action to control the entry of skins of tigers and panthers into tanneries, taxidermists and dealers shops.

If news paper reports are correct some States, Madhya Pradesh for one, have gone a step further and banned all shooting. It was not clear whether this ban includes the shooting. If it does, in our opinion this would not be a wise step for that State still offers some excellent murghi (Jungle-fowl) and partridge shooting. There are a large number of professional trappers who roam about the country-side and, the total ban on shooting would only result in giving them a free hand continue their profession, with greater success.

While the ban on shooting of some species is a step in the right direction, the States must take positive action to make their Wild Life organisations more effective. Uttar Pradesh has recently upgraded the post of Chief Wild Life Warden to that of Conservator of Forests. It is hoped that other States would follow suit. However, more important than

this, is the strengthening of the lower echelons of the Wild Life Organisation, namely the Wild Life guards and wardens. Not only is it necessary to increase their numbers, but they have also to be given the necessary powers and facilities to make them more effective. These days when poachers use jeeps and even trucks, a wild life guard is helpless if he is to rely on his two feet to apprehend them. He often finds that 'discretion is the better part of valour' when confronted with an armed gang of poachers.

A need is felt for a clearing house for information on wild life. It is difficult for private organisations to collect up-date information from each State, for enquiries are frequently not answered. It is suggested that the Wild Life wing with the Government of India, Ministry of Agriculture, which has recently been strengthened by the creation of a post of Deputy Inspector General of Forests...and presumably additional lower staff...specifically for matters pertaining to wild life, serve this function. All enquiries could then be addressed to them and they should be in a position to give authentic information.

The December issue of the Cheetal is being dedicated to the memory of the late Shri S.S. Negi, who expired after a short illness last April. It is felt that this would be a fitting tribute to a man who gave so much of his time and energy to the cause of Wild Life. Readers, particularly those who had the privilege of knowing Shri Negi well, are requested to send to the Editor any articles or items of interest which would reflect the keen interest he took in our wild life.

National Park Management and Nature Conservation in New Zealand

By

SHRI V.B. SINGH I.F.S.

Chief Wild Life Warden U.P.

New Zealand's most significant natural areas are the National Parks set apart 'for the purpose of preserving in perpetuity..... for the benefit and enjoyment' of the public'. The national park system had its genesis in 1887 when Maori Chiefs presented to the Crown, land which formed the nucleus of Tongariro National Park constituted by a special Act in 1894. During the next 50 years, Egmont, Arthur's Pass and Abel Tasman National Parks were also constituted as National Parks—Egmont by another special Act and the other two under a general legislation enacted in 1928. Administration was handled by Park Boards with little or no co-ordination.

The National Parks Act of 1952 laid the foundation for a truly 'national' system of Parks. It established a *National Parks Authority*, representative of Government and private organisations "generally to control, in the national interest, the administration of all national parks in New Zealand". National Park Boards were also created to "administer, manage and control" each park. The Minister of Lands is the Minister responsible for the Act. The Department of Lands and Survey acts as the executive agency for the Authority and officers of this Department serve as Chairman, planning officers, secretaries and treasurers of the Board.

Nature Conservation Council

The country has a Nature Conservation Council to advise Government on matters affecting the conservation of nature. It is an independent body set up to co-ordinate scientific and technical information on nature conservation matters. The establishment of a body known as Environmental Quality Council to enable the country to avoid some of the environmental errors coming in the wake of industrialisation, is under way. This body will have broad terms of reference and will have both official and non-official representatives.

Nature Areas

New Zealand, though a small country, covering an area of 1,03,000 sq. miles has the sixth biggest national park system in the world. The Fiord Land National Park with an area

4,725 sq. miles provides varied habitats, rich in flora and fauna. Its rugged mountains, natural lakes, rich vegetation and various other natural features attract a large number of tourists. The 'kiwis' are proud of their national parks and will not tolerate their mutilation in any form. A proposal to raise the level of Manapouri lake in Fiord Land Park, for providing additional power to an industry, raised unprecedented protests all over the country. Over a long period, televisions, radios, newspapers and other publicity media were used to fight for the cause of nature conservation, on this issue. A petition, which established a record for the number of signatories, was presented to the Parliament. The issue of Manapouri Lake formed one of the main issues on which the bye-election of Marlborough Parliament constituency was fought.

It is no wonder, therefore, to find that as much as 8,000 sq. miles are dedicated to ten National Parks. This forms nearly 8% of the total geographical area of the country. In addition there are 921 scenic reserves covering an area of 6,31,581 acres and 45 fauna and flora reserves covering an area of 4,52,319 acres. Thus a total of nearly 10% of the country is inviolate and cannot be ruined by exploitation.

Scenic Reserves

As mentioned earlier there are 921 scenic reserves which range in area from a few acres to many thousands. A complete review of these reserves is being undertaken to assess their natural values need for greater protection and potential for development. The basic work is carried out jointly by officers of the Department of Lands and Survey and the New Zealand Forest Service, under the guidance of the Department of Scientific and Industrial Research and the Wild Life Division of the Department of Internal Affairs, together with information from private scientific organisations.

The review is designed to classify scenic reserves into one of five categories (i) Scientific (ii) Scenic A (scenic to look at but little scope for other public use) (iii) Scenic B (scenic with scope for visitor use) (iv) Conservation and (v) other reserves not falling into the previous four categories. On the basis of the field reports, the classification is determined by the Scenic Reserves Committee of the National Parks Authority which also advises the administering body of the reserve on future management.

Of the 921 scenic reserves, 564 have day to day control in the hands of the Department of Lands and Survey, 187 are managed by Scenic Boards (after including a departmental representative), 19 by Domain Boards and 151 by local authorities. Here again, a major part of the administrative and financial responsibilities fall on the Federal Government, for most of these reserves are essentially national rather than local in their value and importance. The need for reservation of particular forest types not already represented in the

existing scenic reserves, in protection forests or state forest parks administered by the Forest Service, are also being looked into.

Scientific Reserves

Reserves in the scientific category receiving increasing attention, are those set aside as reserves for the preservation of flora and fauna. These reserves are designed to protect habitat areas for native plants or wild life of such importance that control of public access is desirable. They include little Barrier Island in the Haurakeri Gulf and Kapiti Island, off the Wellington coast, where the Department employs full time rangers, and such important mainland reserves as the White Heron Colony in South Westland, the Cape Kidnappers Gannet Sanctuary, and the Royal Albatross colony at Otago Harbour.

Coastal Reserves

Coastal areas are under great pressure today. The affluent society stimulates demand for land for holiday cottages in proximity with water for swimming, surfing, boating, fishing and all the trimmings of water skiing and the like. The Department of Lands and Survey has under way a nation-wide review of the coast line to establish what land is already publicly owned and what key areas now in private ownership, ought to be considered for public reserves. This review takes into account the attractiveness of land for present or future recreation, any outstanding natural or scientific features or plant communities, and access from centres of population.

Two projects in the North are among the most exciting developments in enlightened reserves administration. They are the establishment of the Hauraki Gulf Maritime Park and the proposal for a Far North Coastal Park.

Fauna Reserves

As mentioned earlier there are 45 fauna and flora reserves covering an area of 4,52,319 acres, which are set aside either as bird sanctuaries or reserves for the preservation of flora and fauna. A number of the reserves of particular interest are included in scientific reserves.

National Park Management

A Master Plan is prepared for each park which establishes concepts and guide lines for the preservation, development and use of a park. It aims to project needs and provides solutions for the next 20 years. It is in fact the control document that guides or directs the preparation of more detailed action plans for the different facets of park management and development.

Management statements and basic data, like resource evaluation, socio-economic analysis, legislation and legal factors, and land states, etc. form part of the pre-planning stage. Armed with these, planning is carried out to produce a document which provides a guide to preservation, interpretive development and use of the park for the guidance of the park staff and the public.

Master Plan Team

The team approach to planning is now the norm. The team consists of members with different professional backgrounds such as ecology, landscape architecture, natural history, park planning, resource management, engineering as well as private citizens with conservation, scientific or special local knowledge.

Guide Lines for Site Location

- a. Compatibility of facility with environment.
- b. Locate to minimise impact on environment and take advantage of area.
- c. Consider characteristics of site and take advantage of therein.
- d. Adequate service to visitors.
- e. Potential or limitations for expansion.
- f. Access and circulation.
- g. Noise, insects, unsightly surroundings, odours, pollution, weather influencing site location.

The planning has a defined purpose and objective but at the same time it is sufficiently flexible to accommodate changing patterns of use and technological change.

Buildings Facilities and Service

The National Park Authority recognises that artificial or urban type recreational developments have no place in parks. Except in Mt. Cook National Park, all accommodation and villages are provided outside the park area. In Mt. Cook Park, a number of problems keep on cropping up viz. the concessionaire wants all sorts of developments inside the Park to promote his own business. Only where absolutely necessary, motor roads are provided inside the Park. A big park like Fiord Land has only 100 miles of motor roads, but it has more than 200 miles of tracks for nature walks. Parking places are provided outside the park where roadside picnic places are made by cleaning the undergrowth and putting up natural wooden block tables and benches. The tendency to build cement structures is avoided. Open wooden shelters with fire-places, are also provided at different places in the park.

Visitor accommodation comprise hotels, motels, lodges, cabins, etc., operated by concessionaires. Caravan camp sites are operated by park authorities who provide modern facilities at these camp sites. Inside the parks, huts are provided almost every 2½ hours walk away from each other. These huts are owned by mountain clubs, park boards and skiing clubs. Tourists going inside for trekking or for any other purpose are not required to register. An Intention Book is, however, kept at park headquarters, where tourists enter their name, addresses and other details regarding their visit. This information is required in the interest of the tourist himself who may need help and rescue at any time. A charge of 10 cents per night is levied on the tourists occupying these huts and for this purpose an *Honesty Box* is kept in each hut and at park headquarters in which tourists are expected to deposit the dues to be paid by them on this account. It is found that destruction to natural features is greater when overnight hikers are forced to camp out rather than by the erection of huts.

Mt. Cook National Park, rising upto 12,349' is considered one of the world's finest skiing resorts. With a number of glaciers coming down to very low elevations and several skiing runs, the park is very popular for winter sports. A boost to skiing has come with the provision of ski-planes which can land on upper snow fields. Concessionaires run modern launches and jet boats on the lakes and Sounds and inside the park, with regular services to places of tourist interest. Float-planes (amphibians aircraft) which can take off and land on the surface of lakes, are also provided to fly over the park areas so that tourists can see mountains, snow peaks and natural sceneries of outstanding value.

Search and Rescue Operation

The Federated Mountain Clubs of New Zealand organise rescue and search operations. This Federation consists of all clubs, like skiing, trekking, deer stalkers etc. which use the mountains. The Club enrolls volunteers who possess required qualifications and are recommended by their parent clubs. They are registered in each town with the police. The police and national park personnel are permanent numbers of the rescue organisation. Volunteers are experienced ice-man, rock-climbers and bushmen. Food, accommodation and transport are provided to the volunteers, all of whom are covered under a National Insurance. Incidents requiring help arise from hunting, tramping, climbing, animal control, trapping rocks-crambling, cave-exploring, skiing, forest survey, etc.

Nature Walks

All national parks and nature areas are provided with well laid out nature walks of various lengths. There are short walks for the aged and longer ones for the young people. The tracks pass through areas representing various vegetation types and other natural attractions. At the starting point, leaflets giving details of the route and the natural objects

to be seen, are kept in small open wooden boxes hoisted on poles, which the tourists are supposed to use and then return to the box after completing their return journey. Each different tree, shrub, climber, fern, etc., carries an identification name plate. Questions on nature which could be answered after actual nature observation, are also given on another board a few yards ahead. These walks are refreshing and educative, with resting places at intervals.

Long distance trekking is also provided. Trekking in groups is encouraged as a precaution against accidents. Resting huts, located at regular intervals have facilities for sleeping, cooking and conveniences. Trackers are expected to carry their own food-stuffs, which in some national parks are provided on advance intimation. There are guided tracks also. The Milford Track in the Fiord Land National Park, considered to be the 'finest walk in the world' is maintained in high standard by the New Zealand Tourist-Hotel Corporation and consists of a three day walk. Comfortable huts along the track have resident caretakers. Food and bedding are supplied, and competent guides control each party.

Overhead Wires

The use of national parks as corridors for power and telephone lines is discouraged and criticised by the public. Where there is no reasonable alternative, every effort is now made to have them put underground, with some success.

Roads

Most park roads in New Zealand are the responsibility of other agencies of central and local government. This has created a problem for the national parks as it leads to uncontrolled use of parking areas for overnight camping. High speed logging trucks make driving for recreational tourists an unnerving experience. It is considered necessary to ensure that park roads do not intrude on the natural scene. They should be safe but not encourage speed levels that prevent enjoyment of the scenery.

Interpretation

Park interpretation is universally accepted as an integral and necessary park function. The following quotation from the U.S. Park Service Administrative Manual justifies the importance of interpretation:

"Through interpretation, understanding,
through understanding, appreciation,
through appreciation, protection."

The general policy of the New Zealand Park Authority is :—

- (a) to foster public appreciation of parks and their natural features through park interpretation, by the provision of adequate information and interpretation services,

including park hand-books, information leaflets, maps, talks, guided walks and self-guiding facilities such as nature walks.

- (b) to assist Boards to develop interpretation programmes using headquarters buildings and museums as information centres.
- (c) to encourage Boards to use the services of park naturalists on a part-time or full-time basis.

The chief aim of interpretation is not instruction but provocation. The Park Boards co-operate with school groups in inculcating in students, a love for nature. An unprecedented community effort has seen a 70-bed youth lodge built for a fraction of its value. Here, a resident teacher assisted by park rangers, is using the park as an outdoor classroom for secondary school children who are gaining educationally and socially from the experience. In Fiord Land National Park, young men at odds with the society are gaining a sense of social responsibility, working as a team in track-cutting and hut-building on a tramping route to Dusky Sound, as part of a rehabilitation project for inmates of the Invercargill Borstal Institution.

Park headquarters buildings are erected in the parks to serve as centres for information, displays and lectures. Besides collective publications, each national park publishes its own brochures, mini-folder guide books, giving all information about history, geology, vegetation, insect and bird life along with information on recreational opportunities, such as mountaineering, skiing, tramping, hunting, fishing, etc.

Flora and Fauna

Permission to remove plants is given by the Board only for scientific purposes, and the removal is then supervised by a ranger. No exploitation of forest or vegetation is permissible.

Within the park all birds, native or introduced are absolutely protected all the year round. Even birds such as Keas, shags, hawks, Canada geese and ducks which are regarded as pests or as game in parts of New Zealand, are protected in parks.

The introduced animals, such as opossums, rabbits, hares, deer, pigs, goats, stoats and ferrets which are all declared as noxious animals by law, and which have an adverse effect on vegetation and bird life, may be destroyed. For reasons of safety, a permit must be obtained from the Board before a firearm may be carried in any part of the park. The native mammals are fully protected.

Finances

No entry fee is charged in New Zealand national parks. But the major sources of income are from fees for use of public utilities, concessions income and from use of recreational

facilities. With its system of National Park Boards, national park income appears in the accounts of Park Boards and can be used for the development of parks.

Government finance is the major source of income. Direct Government appropriation for national parks administration, maintenance and capital projects has grown from \$ 24,658 in 1952/53 to \$ 352,000 in 1968-69. The Park Boards income is estimated at \$ 73,700 for 68-69, i.e., 14% of the total. The financial situation has been improved to some extent by a scheme under which the Government subsidises private donations on a \$ 2 for \$ 1 basis. Subsidy payments have risen from \$ 19,234 in 1964-65 to an estimated \$ 40,000 in 1968-69. The subsidy scheme offers a means by which park users can contribute directly to national parks. Government also makes a substantial contribution through the services and facilities of the Department of Land and Survey.

Money is required to purchase land and to back-up local authorities prepared to zone land for proposed scenic and coastal reserves, if they have the assurance of Government financial support. In 1968-69, Government appropriated \$ 255,000 for reserve purchase but only \$ 40,000 for reserve administration. More money than ever is being provided for reserve purchases, but it is inevitable that more finances must be provided for reserve administration, development and protection.

Wild Life Management

When early settlers from South Pacific Islands arrived in New Zealand about 1500 AD, the only wild life which existed consisted of bats, lizards and a variety of bird life. Abel Tasman in 1642, and Capt Cook in 1770 and 1774 brought with them cattle, horses, sheep, pigs, cats, rats, dogs, etc., to this island. As more and more settlers came in, they introduced several wild life species from different parts of the world. These wild animals were introduced either for sport or for their skins.

Thar (*Hermitragus jemlahicus*) was introduced in two liberations, the first in 1904, of two males and three females, and the second in 1909 of eight animals in Mt. Cook area. Both liberations were made under the auspices of the New Zealand Government with animals imported from the Himalayas. These thrived in their new habitat but did not disperse as quickly as did the chamois. Thars were found to live on the following:—

- (i) Snowberry (*Gaultheria depressa*)
- (ii) Native veroniceas (*Hebe spp.*)
- (iii) Snow grasses (*Chionochlea spp.*)
- (iv) Turpentine scrub (*Dracophyllum spp.*)
- (v) Mountain buttercups (*Ranunculus spp.*)
- (vi) Small turf forming blue tussock (*Poa spp.*)

Eight chamois (*Rupicapra rupicapra*) (Two males and six females) were liberated in 1907 from Austria in the Mt. Cook Area. In 1914 two more chamois were released in the same area. By 1920, herds of 30 to 70 were noticed at one time. In 1930, protection to the animals was removed, and by 1936 culling operations were begun.

Red deer (*Cervus elaphus*) was introduced in 1871 by the Otago Acclimatisation Society. Eight red deer were liberated in the Morven Hills, Lake Hawea. They now record the highest number in the population of wild animals.

Opossums from Australia, were first liberated about 1840, followed by several liberations till 1930. They are now very widely dispersed.

There were some 11 separate liberations of sambhar deer (*Cervus unicolor*) between 1875 and 1921. The first one in 1875, established itself along the Manawatu coastal strip. Between 1914 and 1921 a total of 24 sambhar deer were caught near Foxton and released in the Rotorua district. The resulting breeding colonies though small and scattered, are well established. In India, forest dwelling sambhar have penetrated to the Himalayan foothills and can be found as high as 9000 feet above sea level. But in New Zealand they tend to prefer the lower altitude scrub and swamp areas, manuka stands, and marginal country.

The native wild life consists of the following species:

Lizards, skinks and geckos of several species are found widely. The famous tuatara, the sole survivor of a group dating back to the days of the Dinosaurs, is plentiful on Stephens and Trios Islands, in Cook Strait. The peculiar and primitive Kiwi still survives. The takahe is restricted to the Murchison Range in Fiord Land while kakapo, a large green parrot, is now known only from several valleys near Milford Sound. Of native bush birds, the fantail, grey warbler, and the bell-bird are frequently met with even in gardens.

Noxious Animals and their Control

The wild animals, introduced from abroad, have thrived in their new habitats, and where their numbers are not limited by predators or by seasonally severe climate, they have become pests. They seriously interfere with the protective qualities of the mountain vegetation. The most damaging of these animals are deer (principally red deer), chamois, thar, goats and opossums. But other animals like spotted deer, moose, sambhar deer, Virginia deer, wapti, pig and wallaby were also declared as noxious animals. The destructive combination of red deer which is followed by opossum can lay bare the entire vegetation. The red deer eliminates shrub storeys, and the forest floor cover including young trees, while the opossum, thriving in more open conditions resulting from the deer's activities, despoils and kills the forest canopy.

The control of larger animals like deer, chamois, thar and goats is done mainly by shooting. Shooting by single individual was replaced with shooting by groups or teams of hunters, assisted in some cases by dogs. Drastic reduction of these animals, specially in the higher regions requires shooting from helicopters. With the demand for venison in Europe, specially West Germany, shooting of deer became quite a paying proposition and the use of helicopters was found to be economical. The carcass are cleaned in the forest by removing the gut. They are lifted and brought to cold storages in the towns, where ready cash is paid for them.

For large scale operations to control opossums, poisoning has superseded trapping. Poison is applied from the air over large areas of forest and may be combined with an operation against deer. On a smaller scale, poisoned carrots and baits are spread out on the ground and in trees. Cyanide is commonly used in a paste form, and calcium cyanide is used for fumigating burrows. Only such poisons as are approved by the Department of Health, are used. Areas laid with poison are notified and clearly demarcated by legible boards indicating the type of poison and the period of closure.

Deer Farms

The increasing demand for venison in the markets of European countries has given an incentive to the establishment of deer farms. Under the 'Deer Farming Regulation of 1969' deer farms can be established on which deer are kept in captivity for the purpose of:—

- (i) Farming for the production and sale of venison;
- (ii) Breeding, or depastured for the purpose of being sold or supplied for deer farming.

Licences are given only if the perimeter fence of the farm, separating it from any adjoining land is constructed in accordance with the specification laid down by the Director General of Forests and in no case is the height of the fence less than 6 feet 6 inches above ground level. Adequate catching pens and holding yards as may be necessary to carry out inspections and veterinary testing required under the Animals Act of 1967, have to be provided. The maximum number of heads is laid down, with due regard to the carrying capacity of the area.

A deer farm at Mossbenn, in Southland, covering nearly 700 acres of suitable habitat, was visited. This new farm had nearly a hundred head of deer. For rotational grazing, the farm was divided into several blocks by fences. In addition to the natural food, grasses were sown and rock salt was provided.

Private individuals can keep noxious animals like deer, etc., as pets. Only a limited number of these is allowed under proper licence. Breeding is however, not allowed and all males should be sterilised. Sterilisation by severance of seminal canal, is done and does not affect the outer appearance like the growth of horns, etc. Pets can be sold for

venison and fetch nearly \$ 1 a live pound. Pets can be sold to deer farms also at this rate. Sometimes an animal fetches \$ 150 to \$ 200.

Mount Bruce Native Bird Reserve

As pointed out earlier, several factors have led to the drastic reduction in the number of native birds. Several species are at the brink of extinction. Adequate protection and a suitable habitat can ensure the future of most of the bird species, but those rare species which are facing extinction need additional assistance. It was with this objective that a native Bird Reserve was established in 1961 by the Wild Life Branch of the Department of Internal Affairs. This reserve provides facilities for the holding and breeding in captivity, of endangered species. This reserve also provides facilities for the intensive study of many aspects of these birds. The ultimate objective is to re-establish these rare species in suitable parts of their former range.

The birds that are reared are takahe, eastern weka, saddle-back, Brown duck, kakapo, blue duck, kiwi, parakeets, etc.

The locality is so selected that the area provides a suitable habitat for the different species of birds and has average climate conditions. For ground birds, a wire-mesh enclosure is erected to localise them. For flight birds, large mesh shelters are erected above the natural habitat. Their food habits are carefully studied and the feed is supplemented. Artificial breeding places are provided. Full and detailed records are kept in respect of each bird.

Royal Albatross and other Colonies

As mentioned above, 'scientific reserve' protection centres are provided for rare birds like white herons and the royal albatross. These centres are located in their natural habitat and are securely protected against visitors. No one is allowed to enter these centres, except for scientific study, for which permission is to be obtained from the highest authority at the headquarters. This is not given freely. These centres provide breeding grounds as also opportunities to carry out scientific studies.

Acclimatisation Societies

Under the Wild Life Act of 1953, Government has the power to declare any part of the country to be an acclimatisation district. Government can also vest the control of any district in any society, corporation or local authority, or in any other person or body of persons or in any department of State. At present there exist 27 acclimatisation districts in the country. The main functions of the Society are:

- (i) Protection and preservation in that part of a district that does not comprise or form part of a wild life district under the Wild Life Act of 1953.

- (ii) To ensure by all possible means an adequate population of game species. Breeding, propagation and liberation of existing species or of additional species can be resorted to for this purpose.
- (iii) To issue on payment of prescribed fees, licences to hunt and receive fees for these licences.
- (iv) To administer the provision of Wild Life Act in the district and to undertake proceedings in respect of breaches.
- (v) Investigation of reports arising from the presence of wild life on any land.
- (vi) To prevent the unauthorised release of any animal, whether wild life or not, or unauthorised planting of any plants intended to provide food, cover or other benefits for wild life.

The administrative control of the Society rests with nearly 24 members who are elected by licence holders for fishing and for bird shooting. The term of each member is for 3 years but some of the members are retired every year and are replaced by other elected members. Each society usually has one Senior Field Officer and three District Field Officers, who work in the field. One of the three Field Officers is a fishing technician. Resident Game Keepers are also provided where the district has a breeding farm. The Society has a paid secretary who looks after its administration. The staff is paid by the Society and they are not Government servants.

The Society is supposed to stand on its own legs and its main source of income is through licence fees. They charge \$ 4 for each shooting licence and the following rates for fishing:

\$ 5.00 per male for the whole season of 7 months.

\$ 2.50 ladies licence for full season.

\$ 0.75 juvenile licence for all season.

\$ 0.50 Daily licence.

\$ 3.00 Tourist fishing licence for 30 days.

Each society has, under the Act to share its revenue with the Government. For each shooting licence \$ 0.50 goes to Government for the Game Management Fund of the Government. Out of the fishing licence fees, 15% of the revenue goes to Government for fisheries research under the Marine Department. The Society can always place its problems for research before the Marine Department. Every society can undertake research either solely or jointly with other Societies. For such special projects, Government gives special grants.

The Invercargill Acclimatisation Society earned \$ 12,000 through the sale of 3000 shooting licences and \$ 28,000 from the sale of nearly 10,000 fishing licences.

Under the Wild Life Act, the sale of fishing and shooting rights is prohibited. Licence holders can however, rear birds and shoot them but they cannot allow or invite others to shoot. There are 15 wild life refuges in Invercargill district where no shooting is allowed. Maintenance, protection and improvement of lagoon and refuges are looked after by the Society. Waterfowl refuges can also be established on private lands with the concurrence of the owners. If adequate water is not available in areas fit for refuges, machine digging for water is done by the Society. They also plant *Quercus* plants to provide acorns to the ducks.

Fish Survey

The common fish available in inland waters are the Atlantic salmon (non-migratory), Brown and Rainbow trout, eel, etc. Catches in each stream are regulated after intensive survey of the fish population. High voltage electric fishing equipment is used in carrying out such surveys. I had an opportunity to see a demonstration of the use of this equipment. Fish get attracted by the pulsating current it produces in the electrode put in the water and receive a mild electrical shock. It stuns bigger fish better than the smaller ones. They come up and are immediately collected and put in a cage in the water itself. Each fish is weighed and measured. Based on the data of number of fish collected in a small part of the stream, the total population of the fish can be calculated through a formula. Intensive work on the introduction of new species and the culture of fish is undertaken to ensure regular supply for sport. Inland fishing is reserved for sport only and is not sold.

Game Bird Breeding Farm

The game bird breeding farm at Sorneville near Invercargill, which is run by the acclimatisation society was visited. On this farm, exotic game birds are reared, acclimatised and released in suitable areas. The farm spreads over 5 acres, and is located in a secluded place, completely fenced by wire and tall trees. The resident game keeper is the only person who lives in the enclosure and who manages the farm. No one else is allowed inside. This arrangement is necessary to keep the birds as wild as possible and not to allow them to get used to the presence of human beings.

The farm has an incubator for 350 eggs and a food mixing machine worked by a motor. There are small and big pens of different sizes. The farm has 40 pens of breeding stock (Grey partridge). One good bird gives upto 96 eggs per year. On the average 1200 birds are reared annually. The eggs of the reared birds are brought and kept in artificial

nests made on the ground. Bantam hens are used to hatch these eggs. These nests and birds are covered with open spaces for feeding. The birds are fed on the ground every day. The partridge chicks, when hatched, are kept for two weeks with the Bantams in the small rearing pens. After two weeks they are reared in separate bigger pens for 10 weeks when they are released in prescribed areas. Pre-release catching and destruction of cats, stoats, and trapping and shooting of hawks are a must. Each released bird costs nearly \$ 3 and in some cases the cost is as high as \$ 16 per bird. Before the release, each bird is properly banded and its record is kept. There is a Public Relations Officer who ensures through farmers, the required safety and necessary habitat for the release of these birds. A bird with a band, when shot during the shooting season, has to be reported to the concerned society. Such reports help in the study of the distribution of these birds. Once in three years some birds are caught to study their health and general condition.

Wild Life Districts

Under the Wild Life Act of 1953, Government can declare any portion of the country, whether forming part of an acclimatisation district or not, to be a Wild Life District, which may be empowered for any of the following matters.

- a. The vesting in the Department, the control of all species or of any species of wild life (other than game) in the district.
- b. Where no part of the wild life district forms part of an acclimatisation district, the vesting in the Department of the control of game in the Wild Life District.
- c. The prohibition in the Wild Life District of hunting, killing, taking or disturbing in any manner whatever, wild life other than game by any person without the express permission of the Government.

Suitable persons are appointed as rangers to enforce the provision of the Wild Life Act. The following kinds of rangers are appointed:—

- a. Any suitable person (not being an employee of the public service) to be ranger in a part-time capacity.
- b. Any suitable person to be a ranger in an honorary capacity.
- c. Any servant of an acclimatisation society.

Rangers are appointed for a term not exceeding three years and may be reappointed. Rangers, so appointed, are not deemed to be public servants. The following powers are given to these rangers.

- (1) They can seize any animal, eggs, etc., which are illegally taken.
- (2) Can seize nets, traps, fire-arms, ammunition, boats, vehicles, engines, instruments, appliances or devices, used in the commission of an offence.
- (3) Can seize any bag, container or articles of clothing used for the purpose of carrying animals or eggs, etc.
- (4) Can stop any vehicle, any riding or pack animal, boat, launch or any aircraft or can stop in transit any parcel, package, case, bag, luggage or other container.
- (5) Can call upon any male person, above eighteen years of age, to assist him.
- (6) Can enter upon, pass through or remain on any land (other than a dwelling house or the enclosed garden of a dwelling house) or any hut, tent caravan, hatch or any shop, warehouse, factory, bond store, office or any premises of any description or into any lake, river, pond, lagoon, when he can also carry out a search. He can enter any vehicle, boat, launch or other vessel or aircraft.

The powers so given to rangers, including honorary rangers, help a great deal in the enforcement of the provisions of the Wild Life Act all over the country.

Can The Tiger Be Saved?—The Last Chance

By

RICHARD WALLER

Eight races of the tiger (*Panthera tigris*) are generally accepted according to their geographical distribution from Korea to Java and from the Caspian to Vietnam. One race must now be considered extinct, the Bali tiger (*P.t. balica*); six other races, on which we have uncertain information, were dealt with recently by Guy Mountfort ('Animals' July 1970)—each of these races is down to between 10 and 100 individuals at the most and declining.

The eighth is the type species, often called the Bengal tiger (*P.t. tigris*); it inhabits the Indian sub-continent and overlaps marginally into Burma. The saving of this race is the one hope for the species as a whole.

I have recently returned from six months in India and Nepal where I covered all the major wildlife sanctuaries; our estimate was 1,960 individuals remaining. This may sound a fair number, but when the area over which they range and the recent decline in numbers is studied, it can be realised how serious is the situation. I was first in India in 1939 and the estimate then was 30,000. 1,960 scattered over an area the size of Europe (ex. Russia) will indicate how few regions within this vast area can maintain a breeding population with sustained yields.

Our estimate (acknowledgement help of K.S. Sankhala) of the number of tiger remaining in the wild state in the Indian Union is set against the figure for 1969 :—

1969	1970
2,815	1,872

The breakdown of these figures State by State is:—

	1969	1970
Andhra Pradesh	40	30
Assam	500	380
Bihar	90	70
Gujarat	5	2
Kerala	20	15
Madhya Pradesh	600	480
Maharashtra	329	180
Mysore	100	70
NEFA	100	60
Manipur		
Nagaland		
Orissa	326	150
Rajasthan	90	30
Tamil Nadu	15	15
Uttar Pradesh	500	350
West Bengal	110	40

On the Indian sub-continent, but outside the borders of the Indian Union, two small pockets exist where a few tiger are still found: parts of the Nepal terai with about 70 in all, and the Sunderbans of East Pakistan with only about 20 remaining. The beautiful reserve of Sukla Phanta, situated in the western Nepal terai, is close to the Indian frontier. Mountfort ('Animals' July 1970) estimated 250 tiger in this reserve barely two years ago. They have now been literally decimated by poaching from both sides of the border. The Sunderban tigers apparently did not suffer greatly from the recent cyclone which took such a devastating toll of human life; probably in part because the tiger swims well and also because the cyclone hit the land slightly east of the main tiger area. Even so their numbers are declining. Many tigers in this remote area of predominantly mangrove forests are man-eaters from lack of sufficient normal prey; this makes it easy for the poacher who can always claim that he shot in self defence and no one can prove to the contrary.

The main decline in numbers of tiger in India has taken place over the last thirty years—from about 30,000 in 1939 to under 2,000 in 1970. Before the Second World War the wildlife in the forests was, rightly or wrongly, looked upon as the preserve of the rulers; the Princes and the British. Then in 1947 came independence for India and Pakistan and with it the feeling of the people "the forest and their animals now belong to us"; so they went into the forests and killed everything they could see. Considerable slaughter of the tiger and his prey continued for nearly ten years; then the Indian Board for Wildlife was set up to confront the rapidly worsening situation and over fifty wildlife sanctuaries were created in India between 1950 and 1960. Many of these unfortunately are sanctuaries only in name; no protection is given and now they have little beyond birds, but it shows that the will to act was there already in the fifties.

The really dangerous decline in tiger numbers has taken place in the last five years since 1965. This sharp decline into danger of extinction is almost entirely due to the commercial value of tiger skins. All these skins come from illegal poaching, whether by the poorer people living in or near the forests who poison the tiger's kill with toxic pesticides such as the colourless and odourless 'folidol' (I had evidence of Rs. 1,000 being offered to tribal people in Orissa for a tiger skin with head), or by the more affluent who come into the forest at night with rifle, spotlight and jeep.

"As the educated hunter is forbidden to shoot, the poacher moves in" has been said to me occasionally in India. There is a partial truth in this statement, but it is not a reason to allow tiger hunting to continue. There is nothing against the healthy sport of legitimate shooting provided the species is sufficiently numerous. If it is not, then every form of killing that species must be suspended, even by well regulated Shikar Companies. These Shikar Companies, largely operating in Madhya Pradesh and Uttar Pradesh and dependent on rich foreign clients, are not always scrupulous in observing the law. It is well known that some

manage to "arrange" matters in such a way that their foreign client shoots two or even three tigers instead of the one allowed on his licence. These clients, mostly American with some Germans and South Americans, pay very large sums to bag a tiger. The normal charge is Rs. 1,000 a day (£56 sterling) and they are usually required to pay for twenty days to ensure a tiger. Early in 1970 one American paid Rs. 1 lakh (about £5,600 sterling) for one tiger! These prices give some idea of the difficulty of shooting a tiger and the desire of men to do so.

Wildlife is a State subject and cannot at present be governed from the Centre at Delhi. However every State where the tiger is found has now followed the strong recommendation of the Prime Minister and has banned the shooting of tiger for varying periods of three to five years, with the notable exception of Madhya Pradesh*. It is however hoped that means will be found of bringing pressure to bear and that very shortly the banning of tiger shooting will be complete throughout India. Nepal is banning tiger hunting with effect from March 1st, 1971.

It should be clearly understood that legitimate tiger hunting does not account for a large number. Poaching has been and still is the main danger to the continued existence of the tiger. What I describe as the underground pipeline from the jungle in India to the receiver in a western country—the woman with a tiger-skin coat and bag or the man with the head and skin on the wall of his house—must be cut. The Central Govt. banned the commercial export of skins in April 1969; previously tiger skins had been going out of the country in bales of thirty and forty at a time. This was the first step and an excellent one, but hundreds of skins were still for sale to private individuals in shops and hotels in the main tourist towns of Delhi, Bombay and Calcutta. Last year in the New Market in Calcutta, I saw and priced fifty skins in five different shops within an hour; undoubtedly their were more in the godowns behind. The heads were all poorly set, showing underground taxidermy, and many skins were damaged. Even so, the average price was Rs. 3,500. These were being bought by foreigners who took them out as personal luggage and, if they wished to, sold them for three or four times the amount. Indian citizens were also doing this as it allowed them to finance their holiday abroad.

The Central Governments of India has now taken another important step and from September 1970 the export of tiger skins is totally banned, even as personal luggage. Smuggling will now be the only way to get a tiger skin out of India. This is difficult to control with a long coastline and with many ports full of foreign merchant seamen who can hide a few in the hold without difficulty.

The next step is without doubt up to the receiving countries. America and all the West European countries have now been asked by World Wild Life Fund to ban the import of

*Editor's Note—This state has now also bound the shooting of tiger.

skins and so assist towards drying up the demand. It appears that most governments are favourably disposed to do so, but rightly ask that the race of the tiger found in India should be officially placed in the I.U.C.N. Red Book of Endangered Species, since this would help the necessary passage of legislation. This is being done.

Another step which would help to cut the pipeline from the poacher in the jungle to the woman's coat in the fur shop is the compliance of the International Fur Trade Federation. This Federation has advised its members in twenty three nations to impose a total ban to stop dealings in the skins of five endangered species: tiger, clouded leopard and snow leopard, and a temporary three year ban on cheetah and leopard. The Furriers Joint Council in the U.S.A. has agreed not to cut, fashion or fabricate the skins of the large spotted cats. The legislation in India on the tiger also includes the three leopards.

A further piece of legislation in India is still necessary to make the final break in the pipeline and prevent the poacher from having a market to sell his skins. The State Trading Corporation should be legally empowered to buy up all existing stocks of tiger skins on sale in India. Thereafter any skin being offered for sale could be confiscated and the owner prosecuted. The skin of a man-eater or cattle-killer that had to be shot would automatically be bought by the State Trading Corporation.

I believe that all these measures are absolutely vital to the continued life of the tiger in India. We have got to realise that poaching is impossible to stop completely or even control sufficiently in the immediate future of the next two or three years to save the tiger from extinction. Therefore the only hope is to bring about a situation in which the poacher no longer has any interest in killing the tiger. The measures I have given above, some still to be done, will bring about that desired situation.

I have entitled this article 'The Last Chance' because I believe that is exactly what it is. If the measures I have described are not fully put into practice then I consider the tiger doomed. No one can control the poacher at the present time. Let us be absolutely clear on this and not have any wishful thinking. The Indian Government are doing nearly all that is presently possible. The poorer poacher cannot be blamed; he is desperately poor. The forest guards cannot be blamed for looking the other way on receipt of a small sum; they are desperately underpaid. The real blame lies where the money lies—in the rich countries. The poor Indian peasant and even the forest guard really need the money to feed their children. The rich westerner cannot conceivably need a tiger skin.

Tiger II—if the Tiger is Saved

RICHARD WALLER

In my article "Can the tiger be saved ?—the last chance" I discussed the precarious status of the typical race or Bengal tiger (*Panthera tigris tigris*) and the chances of saving it from extinction in the next two or three years. I now want to consider some longer-term conservation policies which might be put into effect in India to better her wildlife management with special reference to the tiger, and increase foreign earnings from wildlife tourism.

India has 127 parks and sanctuaries listed. The vast majority of these have nothing in them at all except a few small mammals and birds. There tends to be a rivalry between the various State Governments in the Indian Union, to vie with each other in having so many wildlife sanctuaries. The wish to have them is commendable if they were protected, but there is little hope of money in the immediate future to protect them and in any case there is nothing left to protect. They are sanctuaries in name only.

The aim for the future must be a few large, very well protected National Parks staffed by a well-paid Wildlife Service. The largest at present in India is Periyar with 305 sq. miles, very small in comparison to E. Africa (e.g. Uganda's Elizabeth Park of 2,500 sq. miles) or to America (The Yellowstone Park of 3,500 sq miles), but still large enough to form a viable eco-unit and to hold even the roaming tiger and elephant.

Protection is vital; there must be total exclusion of cultivation, grazing by domestic livestock and forestry operations. The staff must be well paid; they will deserve it as they will be well trained, since the higher echelons at least will have passed through the Wildlife Management Course at Dehra Dun and the Wildlife Guards will have passed through a State or regional course at the appropriate level (in the case of Periyar and the other S. Indian sanctuaries it could be a course at the Coimbatore Forest School). There can be no excuse about inability to give good pay. There will be very few parks or sanctuaries and the money will be concentrated on these few. A highly paid dedicated staff is far better than a large, dispersed, underpaid one. The Wildlife Guards will be well armed with the legal sanction to use these arms in well defined circumstances; they will be well-equipped with binoculars and two-way radio sets and with any other equipment that may be necessary to make a really effective deterrent against any possible poachers.

There is need to increase the natural prey of the tiger which, according to the area, consists mainly of sambar, chital, gaur and pig. In the open deciduous forest preferred by chital, there is no shortage; Schaller (1964) found that 52% of the tiger feces examined

in Kanha, contained chital. In many areas there is no shortage of pig; in fact the predators are required to keep them down as they are prolific breeders and very destructive to nearby crops; this also applies to chital. Sambar however show signs of decline everywhere; this is partly due to poaching but also to the depredations of wild dog and even jackal hunting in groups. Wild dog in particular should be treated as vermin in areas where they are too numerous; in Mysore last April I witnessed a hind sambar separated off, encircled by eight wild dog and then torn to pieces; in Rajasthan last June a similar unpleasant spectacle was perpetrated by jackal on a calving hind. In both cases they were seen through field glasses and I was too far off to effect a rescue in time. All this is a question of wildlife management which will automatically result from well-trained, well-paid staff protecting a properly administered park.

Periyar is a good example for future development. It has no cultivation or forestry operations and virtually no grazing. With a permanent well-trained staff it could be a model for India into which tiger could then be successfully re-introduced, where gaur and pig are plentiful. Corbett, at the other end of India, is another example, with a reasonable area (203 sq. miles) which could be extended; it differs from Periyar in that it already has a good and fairly permanent staff but its conditions of forestry operations and grazing fall far short of the ideal. Chital, sambar and pig are plentiful here and it could, especially if extended, carry quite a few more tiger. Kaziranga, well staffed and managed, is essentially a reserve for rhino. It already has 20 to 30 tiger and it would not be advisable to introduce more into the types of habitat available there. Kanha has suitable habitat, but nothing can be done there until its administration and wildlife staff are properly organised.

When Mr. M.A. Badshah, still a very active conservationist, was the Chief Wildlife Officer of Tamil Nadu, he created a 'Tiger Sanctuary' in the forest-clad hills, 30 kms west of Tirunelveli. The necessary protection was not possible and the sanctuary is no longer affective, but the idea was a good one in a habitat suitable for tiger; it could be recreated when trained men are available to look after it. Such a sanctuary for breeding the tiger is infinitely preferable to releasing them from a zoo, where they have not learnt to kill naturally and will doubtfully survive in the wild.

The overall number of tigers is important but their distribution and density are the vital matters. They are now so few and so widely dispersed that in many areas there ceases to be a viable breeding population and hence no chance of sustained yield. For this a tiger sanctuary would be useful by concentrating a suitable number for the area available. A recent suggestion is a tiger breeding farm; something between an open zoo enclosure and a sanctuary. It could be about 100 acres of suitable habitat strongly fenced; large enough to allow for some natural killing to adapt the tigers for release into the wild.

India holds about 97% of all the tigers remaining in the sub-continent and, unless present conditions change radically in Pakistan and Nepal, where a few still hold out, India is the only hope for the continuance of the species. West Pakistan, since its foundation, has not possessed any tiger. East Pakistan may have a few wanderers in Sylhet and the Chittagong Hill Tracts from across the border. Her only resident population in the Sunderbans is dwindling rapidly and, in spite of a declared National Park, is probably now down to about 20. Of these a high proportion are man-eaters due, according to Tahawar Ali Khan who probably knows them better than any man alive, to being taught by their mothers this form of killing as well as to lack of suitable prey (a few chital and pig only). Man-eaters in the rest of the sub-continent are virtually non-existent at the present time. In five months I heard of none in any part. Hardly any tiger today survives the poachers weapons to live beyond five years of age; normally it is old age or wounds, or a combination of the two which cause man-eating (Sunderbans tigers excepted).

In Nepal, the situation is particularly tragic since it does not have to contend with the intricacies of democracy as India does, when seeking protection for its wildlife, and rigid protection could be brought within 24 hours if the order came from the right quarter. As it is, the Kanchenpur Sanctuary in the Terai of West Nepal which includes the beautiful reserve of Sukla Phanta, up to recently famous for its tiger, now has only 10 to 15 at the most (J. Blower, U.N. Wildlife Adviser to Nepal. pers. comm., May 1970). There will still be a few scattered through the rest of the Nepalese Terai, certainly round the site of the commercial venture of 'Tiger Tops', and amounting in all to perhaps 60 or 70.

Recent news however from Nepal (Feb. 1971) is most encouraging and the King is taking a personal interest in the necessary protection for Sukla Phanta. Arrangements are being made for the removal of the villagers and their cattle to other suitable sites outside the sanctuary (J. Blower. pers. letter). Funds have also been allocated by the Nepalese Government for the demarcation of the other, formerly excellent, sanctuary of Chatawan which used to hold many rhino and some tiger, where in recent years the habitat of both species has been largely destroyed by unauthorised over-grazing by thousands of cattle. It is hoped that U.N., whose specialised agency F.A.O. now has a Wildlife Conservation Branch, will shortly assist the Nepalese Government with more funds and personnel for the effective development of these projects.

On the assumption that the decline in the numbers of tiger in India is being arrested, it is interesting to examine the chances for the average tourist of viewing one, since this is one of the main aims of the foreign tourist in the wildlife field and a failure to do so leaves a certain sense of disappointment.

The visitor has the best chance of seeing a tiger in the Kanha and Corbett National Parks. In Kanha the average density is one tiger to 3.5 sq. miles, in Corbett one to 4.5 and in Kaziranga one to 8.5 with all the others far behind. Not only is the density of numbers greater in Kanha but the forest, especially the Sal (*Shorea robusta*), is fairly open with little undergrowth, giving a better chance of viewing a tiger in daylight. However it is around the Tourist Rest House at Dhikala, near the centre of the Corbett Park, that the foreign visitor probably has the best chance of seeing tiger during a short stay. In three days at Dhikala we distinguished five individuals (3 tigers, 2 tigresses) moving within three kilometres of the Tourist Rest House. Approximating this area at about 36 sq. km. or 15 sq. miles, this gives an average of one tiger to 3 sq. miles, the highest concentration of tiger I came across in India. Kanha was the next with one to 3.5 but that was over the whole park and was not substantiated by me on either direct or indirect evidence. The interesting point about the high figures for this area in Corbett Park is that it centres on the Tourist Rest House, which is the basis for my suggestion that this park offers the tourist the best chance of viewing tiger. The Warden estimates that as many as 10 to 12 of the park's 40 to 50 tiger can usually be found within a radius of 8 kilometres (5 miles) of the Rest House at Dhikala. He told me that live bait are now tied up during the tourist season, but that beats for tiger by elephant are not normally held more than twice a week to avoid too much disturbance. Even so he reckons 25% of tourist to Corbett saw a tiger in the last two years, based on numbers of visitors in their books; but of course many stay only two or even one day. Assessing this another way, I would put the chances in Kanha at 10% (i.e. if a visitor stay ten days he would be very unlucky not to get one viewing,) while those in Corbett I put at 20% (i.e. if a visitor stays for five days he would be unlucky not to view once).

Other parks and sanctuaries where tourists may be lucky enough to see a tiger are Kaziranga in Assam, Sariska in Rajasthan and Palamau in Bihar. Mention should be made of the Chanda district of Maharashtra, where the average density may be one to 10 sq. miles; the adjoining district of Bastar in Madhya Pradesh may also have some pockets of density similar. A density higher than one to 3 is not desirable as tigers need large ranges even though males do often tolerate each other. Assam remains the big question mark and there may well be some high densities and healthy breeding populations in the inaccessible forests of the far north and east. Tourists are not, at present, permitted in that area.

If the tiger is saved and its population is to increase, then continuous and vigilant protection is essential. Protection requires money and money comes from tourists. All tourists want, above all, to see tiger and most of them have no conception of how difficult this is at the present time. Some of them come on package tours which include the East African parks where lions are as prolific and in evidence as cats in the squares of Rome.

Understandably they are disappointed in the animal viewing in India. No one has prepared them for this difference and the tourist brochures and agencies are partly to blame.

India can certainly learn about tourist facilities and techniques from East Africa, but beyond that it is pointless to compete. Rather she should accentuate their differences in her tourist brochures, stressing above all the thrill of elephant riding through the jungle which makes one a part of the habitat and identifies one with it in a way that no amount of driving in cars or landrovers across the savannahs can ever do. In East Africa the tourist sees the magnificent spectacle of hundreds of wildebeest, hartebeest, zebra and gazelle, as if on a television screen. He is purely a viewer quite separate from the spectacle. In the Indian jungle he is integrated into the life of the forest because he is riding on one of its own animals.

The problem of showing tiger to eager tourists will remain. They can click their cameras and blow their noses at the lions in Nairobi Park who merely look bored. A tiger is truer to the cat tribe and is suspicious and wary; the slightest rustle of a sandwich paper in a machan and the tiger will never pass that way again that night. Tourists should be forewarned of the totally different habits of the tiger and the lion; the one nocturnal and solitary in the forests, the other largely diurnal and sociable on the grasslands. They should be prepared for the rarity of tiger viewing; but when it comes, during an elephant beat or from a machan, what a fabulous thrill; no animal viewing in Africa can rival it. Not the normal tourist viewing at any rate, though my encounter with a mountain gorilla in the Congo quite equalled a tiger in India. The difference lies in the fact that a tourist in Africa does not expect to see a gorilla nor has he set hopes on it. A tourist in India has definitely set his sights on a tiger; to increase his enjoyment or lessen his disappointment he must be conditioned beforehand.

There is certainly no lack of talent in India for efficient advertising. Air India is a model for good and telling publicity about itself and India. Some of this talent could be borrowed to publicise, in an informative way, the wildlife parks and sanctuaries. Hopefully this will bring more foreign tourists and foreign exchange. The increased flow of tourists will present even greater problems for those responsible for showing them tiger. A comfortable and spacious observation tower overlooking a permanent waterhole where a live bait can be tied is probably the best answer. Only the very experienced expert can keep still all night or even for two or three hours; most tourists cannot be expected to do so beyond a certain point. They get hungry or thirsty and need a sandwich or drink; for this a small room with no windows behind and an open balcony is very useful. More elephants will be needed to be stationed in different parts of the park; tourists can then be driven by jeep to different points where tigers may be available and there mount their elephants. Too much beating of the

same area is bound to cause disturbance; in Corbett no more than two beats a week are carried out in one area, but more elephants widely dispersed would facilitate more beats and create more satisfied tourists. It will all need careful management. For instance it is not advisable to have too many live baits too frequently in the same area. Tigers get lazy and in one place, where baits were too frequent, they did not bother to kill but ate the wretched animal alive; most tourists would not like this !

Just as there used to be Shikar agencies for hunting the tiger, so there should in the future be Photo Shikar agencies for photographing the tiger. I know of only one; they are doing an excellent job in taking out foreigners to photograph tiger and other animals. The Government of India should initially subsidise such agencies, or at least offer them interest free loans until they are financially on their feet.

I have laid stress on tourist facilities since it is mainly through tourism that more money can be available to pay better salaries to wildlife personnel and protection for wildlife in India can be increased. Why should the Indians, in a country where twelve million extra people must be fed every year, conserve their wild animals just for foreigners to go and look at them ? Equally responsible Indians, with power in the States or at the Centre should realise, as many are now doing, that wildlife sanctuaries cannot only pay for themselves, but earn valuable foreign exchange provided the tourist is offered reasonable hotel facilities and a good organisation for viewing and photographing animals. It can be a vicious circle of poor facilities, badly protected sanctuaries with few animals, resulting in disillusioned tourists. Money must be injected somewhere and convert it into satisfied foreign tourists, spreading the word abroad in Europe and America, more tourists and money and hence better protected and organised sanctuaries with more animals to see. The future of the tiger depends as much on rational thinking along sound financial lines as it does on conservation and wildlife management plans.

In the meantime, while all these new projects for wildlife and tourism are going ahead in India, there is one man who is dedicating every moment of his working day to saving the tiger. Mr. K.S. Sankhala, ex-Director of the Delhi Zoo, started his two year Nehru Research Fellowship in July 1970. He will be constantly touring the various Indian States which hold tiger and progressively assessing the situation area by area. So we should get a continuous picture of the status of the tiger throughout India during the course of his research work, followed by a full census in mid 1972.

An Adventure With Two Tuskers

BY PRIYA DAVIDAR

As a family we are fond of the jungle. Having got tired of hopping from one forest rest house to another we decided to strike roots in the jungle, so we bought a plot of land on the lower plateau of the Nilgiris not far from the Mudumalai Wild Life Sanctuary and built a house there. The Sigur river, a jungle stream, forms the eastern boundary of our property. The house faces the river and all around is miles and miles of jungle. Wild animals in the area come to the stream to drink, often in full view of the house and frequently cross our property when trying to cross from one stretch of the jungle to the other. We call our place 'cheetal walk' after the cheetal that walk through it.

Ever since we built our house we have been spending most of our weekends and holidays there. As may be expected we have had lots of adventures there, some quite thrilling. We have seen elephants chasing people, people chasing elephants, wild dogs hunts and other more intimate forest dramas.

We built machans or tree platforms along the river bank to sit and watch wild life. One such machan built in a clump of bamboo on the north-eastern corner of the property, commands an extensive view of a long stretch of the river. This we called 'Bamboo Tops'. Animals crossing from the jungle on one bank to the other have to cross the river bed, and can be easily seen from the machan.

Last year was a dry year, and the Sigur river ran dry, barring a few pools. One such pool was formed below the machan.

One evening during this period, my father and I sat on the machan and watched. A few spotted deer came and drank the dirty water of the pool. They had no choice. Suddenly we heard a bamboo crack. We sat still and looked in the direction of the noise. A tusker was standing some distance away on our bank of the river. It merged so perfectly with the evening shadows of the jungle that it would have been impossible to make it out but for that noise. It came towards us, and as we watched it with trepidation we saw another tusker following it. One was bad enough, and here were two to contend with. The clump of bamboo in which the machan is placed is fairly thick; but two determined elephants could have made short work of it. Some of our elephants are desperate characters, having been shot at by cultivators whose crops they are fond of raiding and are perpetually at war with the human race. It is amazing how silently, swiftly and majestically these huge creatures can move in such thick jungle. The first tusker was slow in coming. The second tusker overtook it and came on and on. The machan was quite high on the stream side, but not so high on

the other side and could easily be reached by an elephant. When it came level with the low side of the machan, it stopped. It was a young bull in the prime of life. I could have stretched my hand and touched the elephant if I had wanted to. But I was not going to do anything so silly. Instead we crouched and made ourselves as inconspicuous as possible, not daring to move or make the slightest noise. We spent many anxious moments like this. Then a fickle breeze carried our scent to it. Elephants have a very keen sense of smell, much better than their sight. We saw a look of surprise come into its eyes. Our scent at such close quarters must have struck its sensitive nose like a powerful whiff of smelling salts. We thought the game was up. We crouched holding our breath and fearing the worst. We expected it to react violently. But fortunately, it was not one of our desperados. Even if it was it did not seem to be in a vengeful mood. It decided to follow its companion which had in the meanwhile walked into the river bed.

It was a great relief. But still the presence of two elephants within a few yards of us was not a comforting thought.

The elephants went to the pool, sucked up the water, and instead of drinking it, sprayed themselves with it. They were certainly choosy and would not drink this water which was filthy with dead fish floating about. They also sucked some liquid mud and coated themselves with it. Elephant's skin though thick, is very sensitive. Mosquitoes and other blood sucking insects that swarm the jungle, look to elephants for a easy and sumptuous meal. Elephants have found that a coat of mud, besides being an answer to this problem, keeps them cool. One had an injury on its leg and gave the wound a double coating of mud.

Bull elephants come out of the herd either by choice or out of necessity, because of a stronger rival and lead a solitary life, the length of which depends on circumstances. Sometimes two or three solitary elephants gang up to form a party. Here was one such party.

The younger elephant, obviously the stronger of the two, was the boss of this two elephant team. After the mud bath it proceeded to dig a hole in the sandy section of the river bed. This in itself was an interesting operation to watch. First, it kicked away the top layer of sand, then dug with its trunk, throwing out the sand thus dug out and making the hole deeper and wider. Then it waited for a while for the water to percolate into the hole. The first percolation that formed a pool was not too clear. The tusker sucked it up and sprayed itself with it. As clear water started percolating in, it drank, sucking the water with its trunk and emptying it into its mouth. In Africa where it is quite dry, elephants have been known to dig deep wells in stream beds to get at the water. Water being freely available in the elephant country in India, this occurrence is uncommon. For an African elephant that has been digging wells from time immemorial, this may be nothing unusual. But for an Indian elephant to do so, shows that it can think for itself. In spite of the danger involved

I am glad that I had the good fortune to witness an elephant engaged in this unusual occupation. It was a slow process as the percolation was unequal to the task of coping with the elephant's enormous thirst.

While this was going on, the other bull was getting restless. Unable to hold its thirst any longer it edged closer to the drinking hole. The younger bull at once turned on it and chased it away.

After a long time it finished drinking and moved to a clump of bamboos growing at the edge of the further bank of the river, bent a stem, stripped the leaves off it by the trunkful and ate. When the elder tusker took its turn at the pool and drank, it looked as though it would drink for ever.

It was growing dark and we were getting impatient. We wanted to get away before it became totally dark. Our fear was that if the elephants decided to move to either side of the machan we would be stuck. We could not simply get down and walk away. The nearer elephant could have reached us in one stride.

If the elephant would not move, we decided to move it. We could not do it too obviously for fear of aggravating it. This had to be done with great tact. We had kept on the machan some stones for use in an emergency. My father picked up a stone, rubbed it well to transfer to it some human scent and threw it gently a couple of feet in front of the elephant. The elephant stopped drinking, looked at it, smelt it, but would not move away. We had with us a small white paper packet. We put a stone into it and threw it near the elephant. Still the tusker would not budge. Then my father took his handkerchief, wrapped it round a stone and threw it. It missed the elephant's trunk by a fraction of an inch and landed right into the drinking pool with a plonk. And that did it!

The elephant had had enough of these guided missiles and decided to quit. It was just as well. When we hurried down there was just sufficient light to guide us back.

The cover photograph—in colour—on the previous issue of the CHEETAL.—MARCH 1971 was taken by Miss NIHAR SWAIN and not by Mr. S.R. Choudhary. The error is regretted and we are thankful to Mr. Choudhary for correcting us.—EDITOR.

Indian Falconry

By K.S. DHARMAKUMARSINHJI

It gives me much pleasure in writing this brief note on Falconry for the "Cheetal", though, unfortunately, at a time when Indian falconry is no more. Although, the picture I portray in this article is not a bright one, I hope it will give some idea of the conditions in which falconry was practised in our country and why it is no more. India is a country of relics and monuments, some of which are of exquisite beauty and age and our history is full of glorious anecdotes of outstanding significance. So also in Indian falconry, these are historical events.

At a historical peace-seeking mission by Raja Man Singh of Amber, to Mewar, it was said that, Maharana Pratap once conveyed to him that he (Man Singh) was just like a captive hawk on the hand of the Emperor (Akbar), and that he was released to capture his quarry at the Emperor's sweetwill. The peace negotiations obviously broke-off and the embittered Man Singh returned to Delhi hoping to be unleashed to take his vengeance.

In new India we find very little on record about falconry and the people who practised this sport, are on the vanishing list. It is tragic to think that there is practically no record on Indian falconry and the art is now almost dead. What we see today of falconry in India is in the old paintings in which emperors, kings, nobles and their retinue are shown posing or hunting with hawks, dogs, cheetahs and other animals. We have no detailed description of the sport other than what has been written in the '*Ain-e-Akbari*', '*Tuzuk-e-Jehangiri*', '*Shah-Nama*', some Persian and Arabic Baz-Namas and in some Sanskrit works. This shows that the sport was very popular in ancient times and had reached a very high standard. Until Independence, falconry was practised in India on a high level. I do not intend to enter into historical details, but two aspects are worth mentioning, viz. much of Indian falconry entered this land before and after the Moghul invasion, and that, a form of falconry existed before this period in certain Eastern and Southern parts of India amongst the Rajas and aborigines. We still find traces of this in Bihar. With Indian Art, Indian falconry also flourished. And we see it in its full glory during the zenith of the Moghul period. The decline was slow and perhaps unnoticeable, and yet the art had spread amongst the Hindus, Sikhs and even Brahmin nobility. During the British period, Indian falconry was being practised in many parts of India, specially by the princes and landlords. Most of the professional falconers were Mohamedans. As an art, falconry had many admirers, but it did not appeal to the Hindu masses, perhaps because of the non-violent attitude of many vegetarian sects and for the amount of blood-letting it involved. As a

sport it was popular amongst the martial gentry, and as an art it was recognised throughout the realm. Babar enjoyed hawking and so did his descendants. However, Emperor Akbar did not have much taste for it. He liked to face danger and falconry may not have held that excitement for him. Yet, he was selective and took preference to the "*Basha*" (Asiatic Sparrow Hawk) and the "*Besra*" which is a courageous little hawk smaller than the European Sparrow-hawk and yet as swift and bold. Of the small Accipiters, this hawk seems to be the most outstanding for its speed and audacity. Akbar's choice for this hawk must have had some reason. I shall not try to explain it. But those who have seen it fly and perform, cannot but feel amazed. So much for the "*Besra*" and Akbar's fancy. Later the "*Baz*" or Goshawk (*A. gentilis*) was no doubt the most esteemed hawk, and the sign of royalty, as it was also in Iran, China and Japan. However, among larger falcons the Saker and the Peregrine were mostly used. In fact, many species of bird-of-prey were trained, including, Eagles. The "*Shah-Baz*" or Crested Hawk-eagle, useful for taking large prey, was most decorative and impressive for ceremonial occasions.

This diverse interest in training different falcons and hawks perfected Indian falconry and there had evolved a class of falconers who specialised in each variety. Thus we see the highest form of art in falconry derived from research and specialisation.

Nevertheless, in India, falconers were not divided into Austringers and Falconers for an accomplished Indian falconer could train both falcon and hawk to perfection, depending on his experience. In fact, in the training of Indian falconers, a young student or pupil had to learn both, how to train the hawk and the falcon. But he was not pushed to train all species. There were however, maestros for Sakers, Peregrines and Goshawks, who specialised in training their birds on special quarry. But those old masters knew their elementary basic training for the important species of hawks, and also reached a high standard according to the experience they had gained. All this they passed on to their sons and thus a class of hereditary falconers was created.

In modern India, a large establishment of hawks was not feasible and the Old Indian School of spending a life time for the perfection of the art vanished when the twilight of the Maharajahs and Nawabs had set in. It was therefore not possible to continue falconry as a major sport. With Independence, falconry had a set back from which it has never recovered and what little was left of it, soon disappeared rapidly in the turmoil that followed. With the partition of India, many falconers were killed, when some Sikh falconers who knew the art of making the famous Indian hawk bells, succumbed and the illustrious art of making the hawk bells was lost to us. Even the widely used Indian hood is now not properly made. This irreparable loss is not realised in this country as falconry is now no more a known sport, though practised perhaps by some few individuals. Thus an ancient art and sport has been lost. Furthermore, the old Masters have passed on to "happier

hunting grounds" leaving no evidence behind them of their success and high achievements. In contrast, falconry in Europe and other countries has survived and many books on falconry have been written and are still being written. In India, old Indian treaties on falconry are lying in the dust, and in some museums, while much of the knowledge has disappeared with the dead. A vain attempt to resuscitate Indian falconry after independence had been made by some eminently interested persons, but owing to lack of official support no club or association could be formed. I had myself forwarded a scheme for attracting tourists but there was no Government encouragement and the scheme was obviously shelved. Some of the past princely states which had indulged in falconry are Alwar, Bhavnagar, Baroda, Bilkha, Darbhanga, Gwalior, Hyderabad, Indore, Kapurthala, Khairpur, Kishengadh, Kolhapur, Jaipur, Jind, Mangrol, Miraj, Patiala, Palanpur, Rampur, Udaipur, etc., etc. The disappearance of falconry in all these erstwhile States and others sealed the doom of Indian falconry. The loss suffered is also a personal one, since I was partly responsible for raising the standard of falconry in India to that of the high international level. Let me now turn to some basic facts about Indian falconry.

Almost all falconers in India hold their hawks on the right hand. The right hand being stronger in most cases than the left, it can be used with greater force and accuracy. For example when delivering a flying start to a hawk, termed the "BATOLA" with the aid of the neck-strap or "halsband", a certain amount of force and accuracy is required. This can best be done by the right hand if one is not ambidexterous or left-handed. Moreover, a rider on horse back prefers to hold his reins with the left hand, the right hand being free to hold a lance, sword, musket or hawk to his advantage. In fact how the falconer should give his hawk a good start, is of vital importance. The manner in which it is done may mean success or failure. Half the battle depends on this launching which is a great help to a tired hawk, capturing its prey. However, the student must learn the art and a hawk must also learn to take advantage of this aid. Some hawks do not learn at all, others after long experience, whereas some students ruin the hawk, doing it the wrong way. The Indian hawk glove is specially designed to assist the falconers in training and releasing his hawk.

In India, we divide falcons and hawks into two categories. Dark-eyed (Shiachasm) and Rose-eyed (Gulabchasm) corresponding to the long-winged and short-winged hawks, the falcons and hawks respectively. Furthermore, great emphasis is placed on the features, coloration and markings of a hawk. Whether or not this is so important as Indian falconers make out to be, I cannot truly say, but I admit that features and colorations do seem to predict certain characteristics of a hawk. In the recognition of features there are many points which are common and accepted by falconers the world over. Moreover there is no doubt that certain eyeries are known for their good production of juvenile birds. We in India, do not depend upon this, as many of our birds are caught on passage or during

migration, hence we can never be certain from where they have come. But their markings and coloration are indicators of their capacity, and even temperament. A certain Maharaja Dhuleep Singh of the last century who spent his young days in England practising falconry, once told a veteran British falconer, which of the hawks would do well at a forthcoming Falconry Meet and his predication, as the falconer later said proved largely true. This art needs deep study. Perhaps, this high assessment of the hawk's inherent qualities is now lost to India. Some books on falconry do, however, give some indications of what is to be looked for in a newly caught hawk.

In India, it is admitted that the immature "passage" hawk is the best for performance. And yet it was the Intermiewed hawk, (*Khani*), that was the most valued. We judge falcons and hawks for their courage and performance. The hawk that captures largest quarry is the best. And a "ringing-flight" (spiralling dog-fight) is more appreciated than "waiting-on" (circling and diving) game. A falcon must have endurance to 'ring-up' high above its quarry and then have enough courage to attack a large bird and bring it down to earth. For this, an expert falconer is required to train the falcon. Of course, with a small bird like a lark, 'ringing-up' affords excellent flight and points have also to be given to the small falcon which does not "carry" (a vice of flying away with its prey). But the show is small comparatively and in days when binoculars were not invented, the performances may not have been so impressive as they are today. There is no doubt that a Goshawk downing a large Crane or a Goose was much to be praised, likewise a peregrine falcon catching an Eastern Common Crane (*Kunj*) or a pair of Saker falcons stopping a fleet Chinkara gazelle, was no mean performance. Indian falconers do use drugs to subdue inhibition in a hawk as it is dangerous for a hawk to encounter large quarry which may counter-attack causing severe injuries to the hawk, with fatal results. A hawk that tackled large quarry could not afford to hesitate, and any intimidation by the pursued would often result in failure. Therefore, the trained hawk had to attack or fly with determination so as to bind on its prey at the earliest opportunity. And the falconer had to be quick in assisting the bird in holding down the prey, once it had been caught; trained dogs playing the part in the absence of the falconer.

Normally, a wild hawk will not tackle large prey which it cannot kill out-right without being harmed itself. The art therefore lay in training the hawk to do what it would not naturally do in the wild. Some hawks are however bolder than others and this characteristic is observed early in their training. An inherent bold hawk with perfect training, is a real treasure. A "waiting on" falcon performs very much like it would do in the wild. It is a matter of training and practice, and the use of stimulants is not required in this type of hawking. In India a high level had been reached in the "waiting on" game such as in sandgrouse-hawking. For this game the adult falcon is often preferred as it has had more

experience in the wild. Nevertheless an "EYASS" (juvenile) is a great asset, and once fully trained and intermewed, may even be better. There is however much controversy about which is better, the intermewed "PASSAGER" or the intermewed "EYASS". And yet it is a matter of "MANNING" and training to obtain the best results, whether the falcon be a "HAGGARD" or a "RED PASSAGER". The spirit of the immature hawk for pursuit and courage is unsurpassed. In India, much importance is given to a falcon which succeeds in capturing its prey, irrespective of its flight performance. This is, to my mind, not always quite right. The 'ringing' flight or chase is the most exciting part in falconry, not the actual kill; nevertheless the kill is important, for often a falcon gets into a habit of repeatedly swooping at its quarry and not binding (catching) it, due to a fear complex, specially in Kite hawking. It then becomes a vice. And hence the kill or 'binding to the quarry' is of prime importance when judging falconry. If a Goshawk flies over the head of gazelle, hare or bustard without attempting to bind, it is a disgrace to the falconer. In Japan, the Emperor's falconer may even commit Hara-Kiri if the hawk fails. The kill is important in as much as it gives moral courage to the hawk and a superiority complex is the secret of success in hawking. Thus the practice of feeding the hawk on its prey, is in most cases done in India where there was ample quarry. However, where birds are scanty, those that are caught by the hawk can be released after ringing (placing rings on their legs) for future record. The capture of large prey by hawks is the basic standard for higher falconry in India. Furthermore, most falconry meets are fixed far ahead of the chosen dates and on these days the falconer has to be ready with his hawk. In this, the art of the professional falconer is again tried and we have seen some of the best flights. Modern falconers are apt to leave too much to the choice of the falcon or hawk. This is not so in India. The use of drugs therefore plays an important role in the performance of the hawk. Drugs may do harm to the hawk, but when one realises that excellent performances are not daily shown and some such flights are rare and far between, the trouble taken in administering a dose is often rewarding. It is here that one sees the difference between the amateur falconer and the professional. In the past large rewards have been given to falconers for outstanding performances. Emperor, Shah Jehan, builder of the Taj Mahal, gave his most talented falconer, Hassan Khan, an elephant, a horse and a dress of honour for having shown His Majesty the capture of cranes with the Shahin falcon (Indian Peregrine).

In the training of various Raptors, eagles have been used, singly or in pairs. Hawking with eagles was well-known in Moghul times. Not long ago, the late Mr. C.H. Donald experimented with a number of eagles in North India. In the past the Hawk-Eagles were quite popular though not much used. I have myself trained the Bonelli's Eagle on antelope, gazelle, and hare, with success. On the whole, eagles are slow and do not show consistency. The Tawny Eagle is a docile and useful eagle for open country. Eagles mean brute force

and a striking heavy weight and yet these birds have a marvellous capacity of using their feet when capturing their prey. Some people consider flights of the goshawk at hare uninteresting. Yet I have had goshawk catching hares at distances of up to 250 yards. But this is unusual. However, a male goshawk or female sparrow-hawk catching a francolin or duck in mid-air, is no doubt a thrilling experience. Whereas witnessing a hawk flying at a large quarry is a singular pleasure, whether it be a ringing flight or straight from the fist. In fact it is a spectacular performance for those who have seen it before. The old stories of hawks pulling out the eyes of deer or gazelle are tales told by ignorant people, who may not have seen or appreciated falconry. I admit that when large prey is repeatedly struck by hawks or eagles the head is often the target and eyes do become blinded. Nevertheless, falconry is no more cruel than any other blood sport, and if at all, much less than shooting small game with gun. It is a great pity that we in India cannot continue the high standard falconry that once existed and that what remains is merely the relics of a fascinating sport. Clubs have been formed all over the world by young and old members.

U.S.A., U.S.S.R., Japan, Spain, Great Britain, France, Germany, Holland, Belgium, South American States, some places in Africa, and the Middle-East do still practise Falconry. In some Arab countries it is overdone by the slaughter of bustards by falcons, yet they are some of the keenest falconers in the world. Golden Eagles in Russia are trained to hunt fox, deer and even wolf.

Some Observations and Suggestions on Kanha National Park - M.P.

By

S.R. CHAUDHARY

(S.R.O.-cum Lecturer, Wild Life Education Course, F.R.I., Dehra Dun)

0. **Context**—Visit with the Wildlife Education Course—first batch of officer trainees—June 4 to 7, 1970—inspection, data collection, literature and discussions with the trainees and local staff.
1. **Basic Data**
 - 1.1 *Area*: 123 sq miles
 - 1.2 *Surround*: A crescent hill range—continuous ridges—walls nearly three fourths of the periphery.
 - 1.3 *Inventory*: Open meadows speckled with patches of tree lands in the central region of the park. Surrounds of the meadows—often with good quality pure sal—dense tall stands—and dry miscellaneous forests with the quality and density sharply deteriorating outward and up, towards the hilly periphery.
 - 1.4 *Principal habitat types*:
 - 1.4.1 Open meadows—preponderance of grass interspersed with tree lands—Axis deer, swamp deer, black buck, gaur and occasional wild pig.
 - 1.4.2 Tree lands interspersed with grassy pockets—mid-slopes and sheltered valleys—gaur, sambar, mountjac and wild boar.
 - 1.4.3 Overlap on 1.4.1 and 1.4.2—tiger and panther.
 - 1.5 *Restrictions*:
 - 1.5.1 Pinch period—April, May and June—may not be so much for quantity as the quality in fodder.
 - 1.5.2 Limiting factor—water—April, May and mid-June.
 - 1.6 *Influences*:

Virtually nil because of no shooting—no logging—no disturbance (!) by human movement at night.
 - 1.7 *Competition*:
 - 1.7.1 Export of fodder—nil.

- 1.7.2 Cattle—2500 in the periphery not with any significant pressure.
- 1.7.3 Intra and inter action in wildlife species—the excessive concentration of axis deer in small patches in the meadows leading to intra species competition and inter species crowding against barasingha and black bucks during pinch period is obvious (1.5.1).
- 1.8 *Predation:* Tiger, panther and poacher (seldom), mainly on axis deer, sambar and barasingha.
- 1.9 *Welfare:* Artificial feeding of maize, etc. and provision of saltlicks in the meadows near the arterial motor roads.

2 Population Estimates (of main species influencing the range balance).

Species:	Years		
	1967	1968	1969
<i>Herbivores</i>			
Cheetal (axis deer)	1777	1575	3215
Barasingha	116	111	98
Sambar	202	269	300
Black buck	16	30	39
Gaur	357	349	460
Wild boar	147	108	205
	<u>2515</u>	<u>244</u>	<u>4317</u>
<i>Carnivores</i>			
Tiger	31	49	39
Panther	8	21	10

- 2.3 *Method of census:* 57 sectors under 5 centers—One Forest Guard with three labours in each sector—simultaneous movement of corresponding groups in each sector during predetermined dates; time and duration of sighting counts—total of species wise animals seen—and tallied at the end for the sector, centres and thus for the park.

3. Observations in the field

3.1 Species of significance.

- 3.1.1 Cheetal—Frequent and in large herds all over the meadows concentrating towards artificial feeding places and saltlicks—maximum count 350 near one feeding ground close to Kanha—approximate concentration in the meadows, around 2000—stray

males with deformed antlers—two recessive stags were seen mounting two females in the close proximity of the dominant stag in a herd of 17, at 11.00 hrs. on June 7, 1970 near Link Road, No. 2.

- 3.1.2 Barasingha—small groups scattered in the meadow often with cheetal—actual visual count in the meadow on June 5, 1970, morning, was 98 with a single large herd of 36—more of females—fewer fawns—very few robust and healthy antlers or pedicels—deformed antlers noticeable.
- 3.1.3 Black buck—pairs and small groups in the meadows near Kanha.
- 3.1.4 Gaur—sighted once, herd of 11 on Link Road No. 7—spoors seen in the meadow indicating nocturnal visits to the grassland.
- 3.1.5 Wild boar—three sighted once in the meadow—spoors sporadic.
- 3.1.6 Sambar—neither animal nor spoor seen.
- 3.1.7 Tiger—not seen—pug marks seen once on 5th, near Sravantal.
- 3.1.8 Panther—seen near Kanha Rest House on a cheetal stag kill—a neat eater after clean diemboweling of the carcass. Similar mode of feeding in two old carcasses of cheetal stags with deformed antlers seen in the meadow—attributed to the same panther. No other spoor seen.
- 3.2 *Range conditions during visit:*
 - 3.2.1 Intermittant showers started two days before and continued during our stay from June 5 to 7, 1970—conditions in the field ideal for the location of fresh spoors—especially pugmarks—and tracking. We were told that the rains dispersal of the populations had started with the onset of the monsoons—presumably due to improvement in the limiting factor viz. water.
- 3.3 *Behaviour of wild animals:*
 - 3.3.1 In the meadows—cheetal, barasingha, and black buck invariably drawn to the artificial feeding grounds and salt licks. They are adapted to the close approach of vehicles, to a lesser degree of elephants but distinctly wary of the human on foot. They form denser multispecies herds, pressing hard for the forage and artificial feeds in the meadows.
 - 3.3.2 Tree-land animals—scattered and very shy of vehicles and man on foot.

4. Artificial Feeding

- 4.1 Place—fixed in patches cleaned of cover due to repeated trampling by hooves.
- 4.2 Food—Maize heaped on the ground.

- 4.3 Salt licks—mounds of earth brought from natural salt lick and cubical artificial salt lick blocks from the market—also placed at 4.1.
- 4.4 Method of ingestion—food picked with the tongue and the lips along with the soil mixed with fecal matter expelled earlier during feeding—salt lick mounds and cubes more sanitary.

5. Future Projects

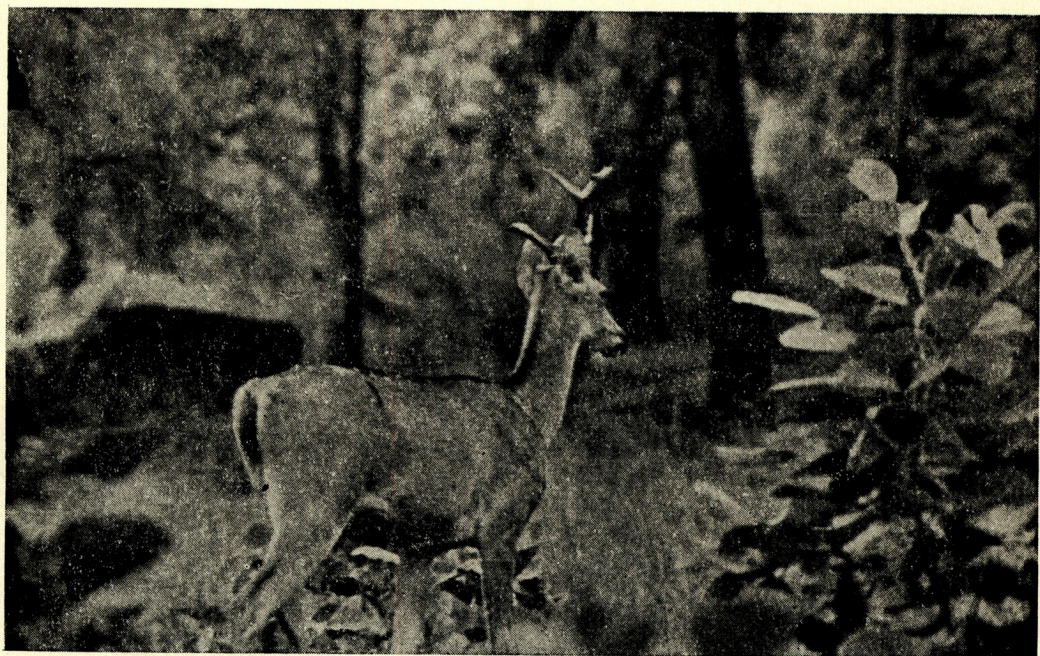
- 5.1 *Expansion of area:* about 120 square miles of additional area beyond the crescent of ridges to the south east—said to have been suggested by the Expert Committee on National Parks, I.B.W.L. (information from local staff)—suspension of logging operation said to be suggested also.
- 5.2 *Research project:* 80 acres of enclosure for the study of reasons for the decline in the barasingha population.

Analysis of the Data, Symptoms, Practices and Projects in 1 to 5 above, and suggestions

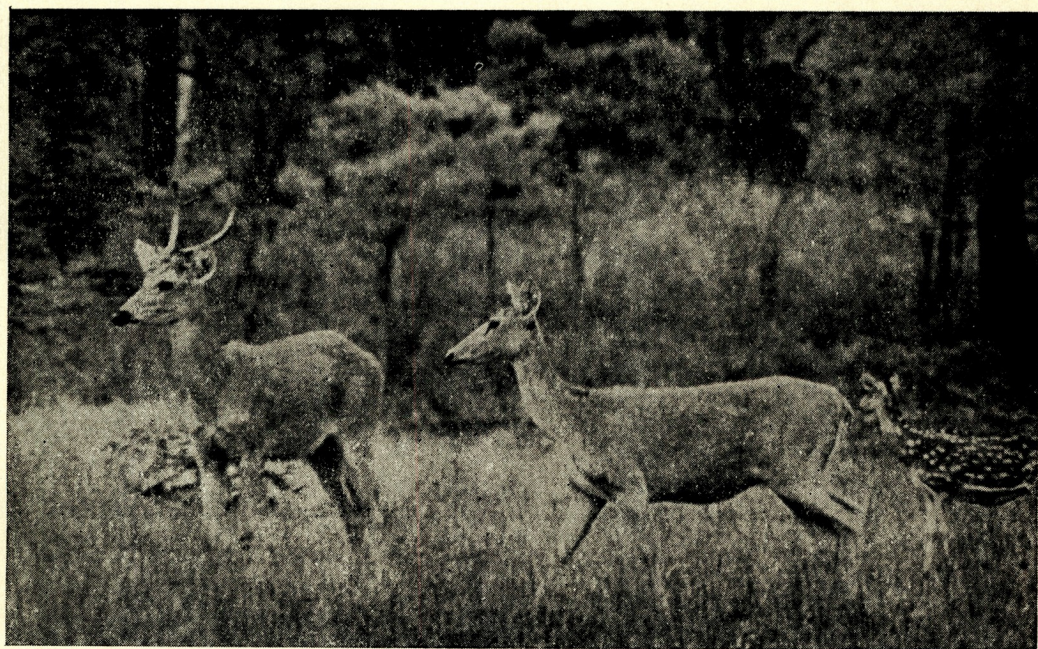
- A **Suspension of Logging:** Suspension of silvicultural operations including logging (1.6) inside the park boundary have perceptibly shown increased congestion in the tree land—distinctly in some good sal forests—to the continued loss of cropable lumber and related forest produce. I believe that the much publicised taboo of “disturbance by logging” has more of escapist features than any positive approach. Suitable silvicultural systems combined with sanitary logging—especially in sal—are a positive habitat improver. The actual disturbance comes with killing—poaching and not due to forestry operations. With co-ordinated silviculture the carrying capacity increases. It can be seen in any balanced range—the Chilla shooting Block in Lansdowne Division in U.P. for example—where logging has not been stopped because of the supposed disturbance.

The main trouble with us in our approach towards the management of wildlife has been to side-track vital issues and fumble with suppositions. Predation by man—legal and illegal—has been the main cause of imbalance or deterioration. We have sadly failed, it must be admitted, in controlling this cause of imbalance, and have been shifting the blame to supposed causes which have no bearing on the actual behavioural symptoms.

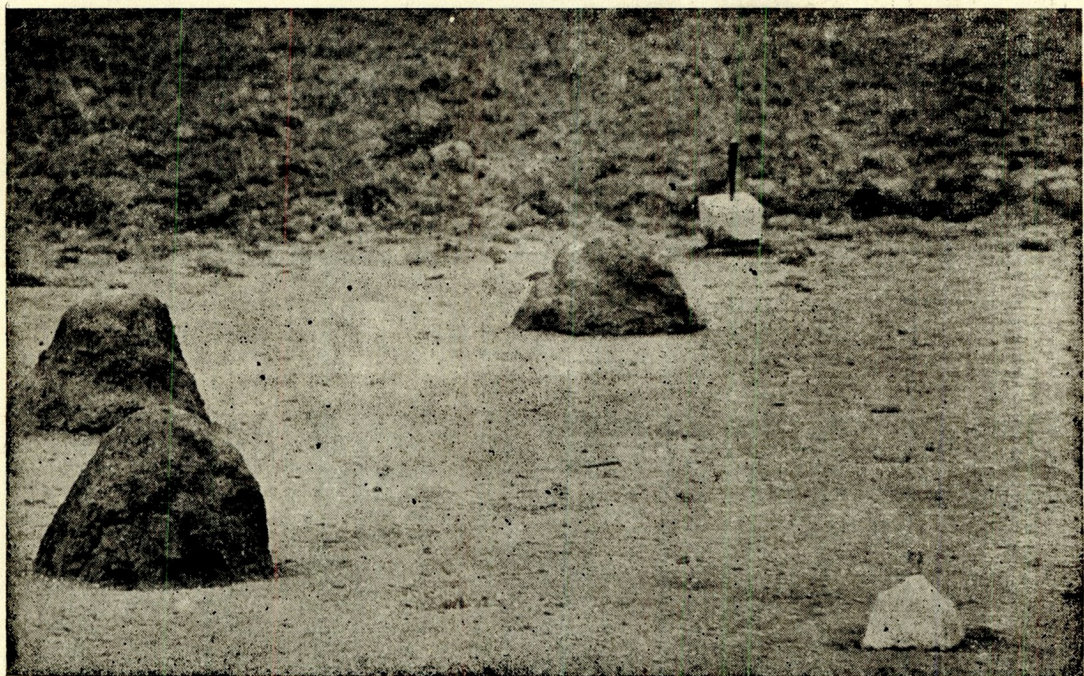
It is perhaps the blind acceptance of those supposed causes that has led to the suspension of the useful habitat manipulation which used to be the inevitable corollary to the rational silvicultural practices in the area now forming the Kanha National Park. The silvicultural practices here could be modified to include sizeable molecules of wilderness areas—the meadows, other niches and areas of animal concentrations—connected by viable belts or corridors if necessary. Such silvicultural



Barasingha stag with left antler short and crooked in Kanha meadow. The thinness of body is evident...under feeding or malnutrition.



Barasingha stag with unequal antler growth in Kanha meadow.



Saltlick and feeding ground in Kanha meadow.

practices including logging, could be executed entirely through departmental agencies.

In the present process Kanha is perhaps already losing income from the land—to the tune of Rs. 10,00,000.00 annually—which could have been earned and ploughed back for much more effective conservation, dynamic management and protection—for the integrated and optimal maintenance of the ecosystem. Now another 120 sq. miles of productive forests—beyond the natural wall of the crescent ridges—are proposed (5 1) to be added to the original 123 sq. miles of the Park.

B Influx: The most significant influx of population—cheetal, barasingha, black buck (resident)—into Kanha meadows (1.4.1, 1.5.2, 1.7.3) is during the summers when there is perceptible overcrowding—needs no quantitative data processing—within the small space in the meadows which again is accentuated by the urge towards the feeding stations. It is but natural that in such a condition in the synecology, the vigorous population of a species—cheetal—with overlapping food habits on a declining population of another species—barasingha—in the same area, will hasten the disappearance of the latter. The cheetal, unfortunately, is not a density dependent species and the period of population overcrowding in the meadows in Kanha is fairly long drawn, leaving its crippling stamp on the dynamics of the populations, especially of those species—barasingha and the black buck—which are forced to compete with cheetal. Such overcrowding not only introduces adverse competition, but increases the danger of the spread of diseases and also in the melee, the transference of negative characters to the genepool.

AA Spread of diseases: The danger is most pronounced in the artificial feeding grounds (4.2, 4.4) where the feed gets strewn on the ground. Here, all animals crowd and compete—the healthy, diseased and the endemic disease carriers. Some defecate also—while at the feeding stations. It would not be the Barasingha alone which would be infected by *Brucellosis*.

BB Minus characters in the gene pool: Poor antlers (3.1.3) indicate poor health conditions ascribable to 1.7.3. Deformed antlers especially the unequal length of antlers as seen in the photographs (3.1.3) show negative characters. The dominant male in barasingha is not that zealous for any herem. Other males also contribute to the gene pool including the deformed antlered ones!

CC Suggestions:

- (i) I feel that stall feeding (4.2, 4.5 BAA) if at all—I do not think it is necessary, only salt licks will do—should be done near the edge of the forest in camouflaged and scattered longish type bush-baskets, high enough to protect the food. Salt licks should be at exposed vertical cuttings—natural or artificial

but natural looking—where the animal licks the salt from the vertical side—as in a natural lick—minimising thereby any chance of infection of the lick.

- (ii) The artificial feeding supplement, if any, could be made preferential only to the barasingha. The feeds could be suspended at a height which could be reached only by the adult barasingha but not the cheetal—the height and longer neck of barasingha gives them this advantage. In the context of the analysis at 'B', it may be necessary in the case of this threatened sub-species to resort to this supplementary feed to keep the breeding adults trim and vigorous. Such a process may perhaps induce the animals to lift their heads and try some richer browse also, re-orient food habits to withstand the competition and, perhaps, better utilise the range.
- (iii) Stags with inferior or negative characters (3.1.1) (3.1.3) should be prevented from contributing to the gene pool. In the case of cheetal, remove, and, in the case of barasingha, if sentiment hurts now, capture and castrate—should be done by a knowledgeable person only.
- (iv) Dispersal of the population should be urged by providing limiting factors—water and salt licks in particular—spreadout in the range and minimising cattle pressure, if necessary, during the pinch period (1.5.1).

C Relation with Human Beings

The reactions of the animals to human approach (3.3.1 and 3.3.2) clearly indicate that in the meadows the animals have been acquainted most with vehicles, which they do not associate with danger and consider the vehicle harmless constituent of the habitat. (In Finland my talk with Virtanen and my diary of January 7, 1969—elk has got so used to the harmless chainsaw in its environ that the earsplitting sound of the motor of a chainsaw is no disturbance to the animal which can be approached very close with a running chainsaw in one hand and the gun in the other!"—an effective camouflage for the poacher? Even there!).

Dynamic wildlife management needs intimate association with the important members of the animal communities in the ecosystem, which can best be done by taking to the woods on foot, and identifying oneself as a part of the ecosystem. The animals accept the harmless human sooner than can be imagined. I can only say that Kanha needs true wildlifers on foot.

D Population Estimates

Refer to 'The Deer and the Tiger' by Schaller,—page 16—population estimate in Kanha is stated to be based on the drive census method; four men to the mile. It is wrong statement because anyone acquainted with the terrain and

cover at Kanha will realise the fallacy of four men trying to do the drive census over a width of one mile anywhere in the park. The actual method (2.3) as explained by the A.C.F. and Range Officer amounts to relative abundance indexing—it is not even a reliable indexing. There is no stratification of habitat types and probable densities. In the meadows—at the time of population estimates in the beginning of June with highest influx—the method may produce results very near the true census in cheetal, barasingha and black buck staying in that area. But in the remaining portion which forms the bulk of the park—with inadequate knowledge of the behaviour and movements of the wild animals and the variations in the covertypes—estimation of the number is a myth. Even the number sighting, with the restriction only on date and time, has no comparability in successive years because the basic parameters—behaviours and movements—are not correlated. It is amply reflected in the results.

AA Examples:—

- (i) cheetal 1575 in 1968 more than doubled to 3215 in 1969 ?!
- (ii) Tigers and panthers in 1968 $49 + 21 = 70 = 55$ adults—the frequency of pug marks (3.1.7) (3.1.8) casts grave doubts on this number—whose annual need of the average wild *artiodactyla* will be 2750 at the rate of 50 to each large cat. Assuming that cattle form 10%—Schaller page 283—it would be expected that many of the ungulates in 1968 should have been eaten up by the big cats and 1969 should have shown a sharp fall in population. The population ratios between predators and preys in retrospect and the actual trends seen from the figures during the last three years are absurd. This fallacy is so obvious that it should have generated other methods of checking and rechecking—weighted sample density estimates in permanent quadrats and transects through pellet and track counts, and indexing of shed antlers, are obvious double checks on the estimate and actual visual counts of the animals.

BB Suggestions

- (i) A very comprehensive range inventory is a must to show the habitat types, the niches and the seasonal population concentrations in various parts of the park.
- (ii) **Broad** stratification on the parameters at DBB (i).
- (iii) In the context of DBB lay out permanent sampling plots—quadrats and transects—for estimation of densities at particular times of the year to estimate density variation during the year and the estimates similarly replicated in successive years to show population trends.

- (iv) Drive census—radiating from central regions to the peripheries in the meadows at the time of highest influx to get the true census in the meadows – combined simultaneously with the density sampling in the remaining area of the park. This should give much more reliable stratified results and hence more dependable population figures of the wild ungulates.
- (v) For tigers and panthers—the suggestions given in my articles “Let us count our tigers”, “The tiger-tracer” and “With the tiger-tracer” appearing in earlier issues of the ‘CHEETAL’ may be followed with necessary fortifications by providing “pad-impression pads” in the field.
- (vi) It is very important, even without any census, to keep an eye on the dynamics of the predator population—tigers and panthers—by *keeping an ever watchful eye on the annual production of cubs* which can be easily seen by the spoors left by each mother and her cubs. That itself may provide a very dependable index on the dynamics of the big cats population. Keep an eye on the mothers and the cubs till the latter grow up.

E Future Projects

AA I am strongly against the increase of area for increase sake. If that Rs. 10,00,000/- annual earning from the forest is being really waived (!) why not think again on a more positive approach (?)—why not continue to earn it and ear-mark it for the dynamic management of the ecosystem including and favouring its wildlife in the present Kanha and its surround (?)—why not minimise competition and obviate danger from cattle by investing in the welfare of the cattle and keeping them under more vigilant control (?)—why not earn the active co-operation of the local people, who must continue to form an intimate constituent of the ecosystem, look into their well being, develop and educate them and, take them with you in the progress of the park and its surrounds (?) why not put in more effective barriers against the poacher (?) why not really know the wildlife as they should be known, more intimately and more reliably confident, with more devoted conservationists working in the field (?)—why not train up and stimulate young men to do it truthfully (?)—why not do these and many other for the integrated development of the park by putting the earning to positive use instead of locking it up in the forest stands and standing inactive looking at it with the pious hope that “Nature will take care if we do not interfere” even when we knew how to interfere for its betterment? ! I would repeat that it is even necessary to open up the congested tree stands in Kanha Park itself for the betterment of wildlife—and that would mean

silviculture, logging sanitation and earnings proportioned to the other needs of the park.

- BB At least three devoted and reliable trained hands should be put to research work in the inclosure for barasingha. They should not only study the deer in the inclosure but also in three separate zones in the park for correlated compilation of data. The work plan for the three, should be very carefully laid out and should have enough resilience in the beginning for modification. The project will necessarily be a long drawn one. Personnel should be carefully selected and once selected should not be changed for at least 5 years.
- CC I add; landscape should form a very important feature in the future projects. Obtrusive installations may drastically reduce the inherent effect of nature. Absorb her, think long and imagine with her before installing anything that is not natural—a house, a storage dam, watch tower, a feed—box even. Careful blending is the trump-card of landscape planner.
- DD Put workers in the field who are keen, sincere and truthful. Wildlifing is often given to wild wishings and imaginings. Make a careful choice. For honestly, the beautiful Kanha really needs them.

From Black Tombstone to Red File

By

PRADEEP MISHRA

Red and black, red for danger and black for extinction, for death, are the colours of the two files of the Survival Service Commission of the International Union for the Conservation of Nature and Natural Resources.

The Red Data Book, records the endangered species of plants and animals and their status, which normally changes with great rapidity towards the point of no return.

The black list is a neatly engraved tombstone for living organisms which have become extinct since 1600 A.D. This too, like the Red Data Book has to be brought up-to-date from time to time.

There were 4226 species of living mammals in 1600 A.D. Of these 36 belong to the black list and another 120 are in the Red Data Book, on the point of extermination.

Till a couple of weeks back the Hispid hare and the Pigmy hog almost adorned the black file of the Survival Service Commission, but on the 29th of May, last, a female Hispid hare and 17 Pigmy Hogs were captured alive near the Tea Estate of Mr. Richard Craves, in Assam. According to Mr. Craves, some forest area had been burnt down near his estate, and he got the news that some of the local tribals were on the point of killing a herd of Pigmy hogs which had taken shelter in an unburnt area. Mr. Craves was successful in persuading the tribals to not to kill them and if possible catch them alive. Very fortunately this was done, and now they are being looked after in captivity. Therefore, the names of the Hispid hare and the Pigmy hog should be transferred from the black list to the Red Data Book.

As a matter of fact, The Fauna Preservation Society, which has always taken keen interest in India's wildlife, has sent Mr. J.C. Mallinson, who is an associate of General Durrel from the Jersey Wildlife Preservation Trust, to Assam, to collect the maximum data possible on these animals.

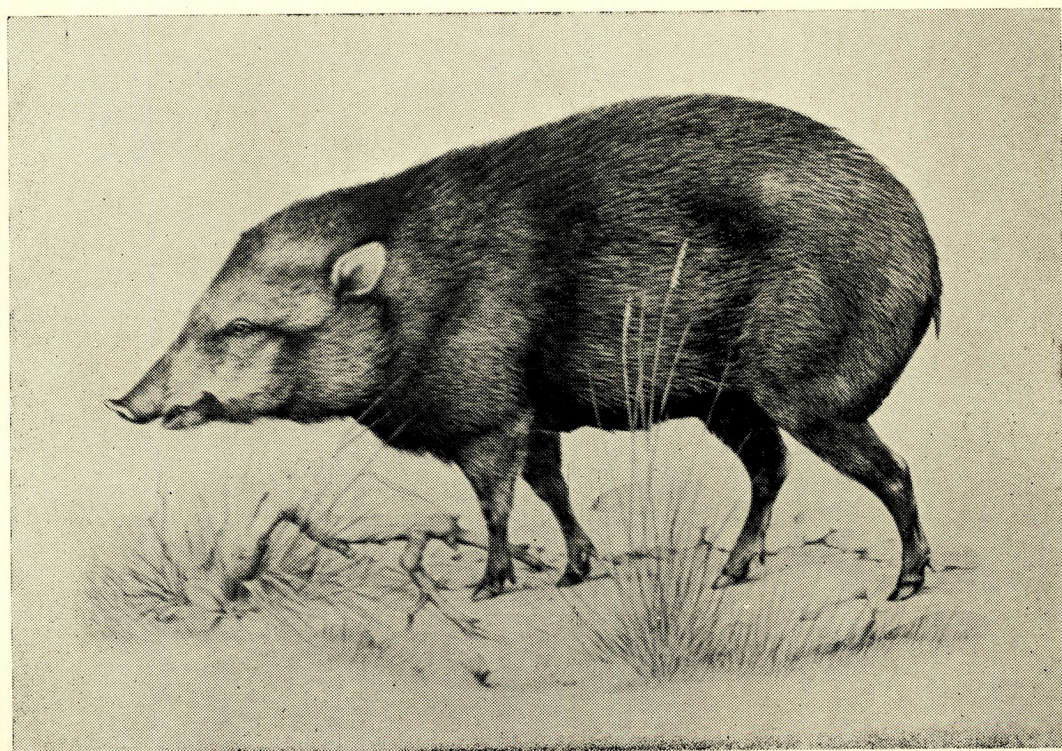
Status In The 20th Century

Back in the first decade of the 20th century, when Shebbeare served in the Goalpara Forest Division of Assam (1907-11), the Hispid hare was not uncommon. They were found mainly in the 'ULA' grass, which at that time covered considerable stretches of the drier grasslands in Assam. But later, when he was transferred to the Buxa Forest Division of West Bengal, he found only a few in that area; as a matter of fact only one about which he could be certain in identification.

Later in March 1926, Col. Faunthrope, while collecting specimens for the American Museum of Natural History, New York, collected a male and a female on the 18th and 20th of that month, respectively, in the North Kheri Forest Division, Uttar Pradesh.

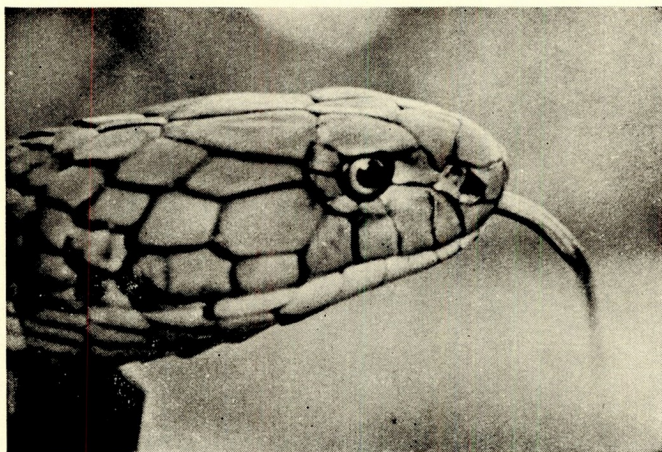


Hispid Hare.



Pigmy Hog.

THE KING COBRA



(For reference see page No. 48)

The last specimen collected was again in the North Kheri Forest Division (U.P.), shot by His Highness Maharaja Sumer Singh of Kishengarh, in March 1951. It was very unfortunate that an elephant stepped on the rear half of the trophy and crushed it completely. But the fore quarters have been mounted and kept by His Highness. After this, no reliable report has been made of occurrence of the species.

It was therefore concluded that throughout the 20th century the occurrence of the Hispid hare has only been reported sporadically.

The Assam rabbit or the Hispid hare, has coarse bristly fur as the name suggests, and is more or less equal to the Indian hare, but the tail is much shorter (about 1/4th of the Indian hare). The ears are also shorter.

The Hispid hare (*Caprolaques hispidus*) appears dark brown from above due to the intermingling of black and brownish white hairs, dirty white below and the tail is completely brown. The hind legs are also shorter as compared to the common hare and the ears are between two and three inches in length.

The true rabbits do not occur in India. The Hispid hare is closely related and as a matter of fact holds an intermediate position between rabbits and hares. Negligible data has been collected on the habits of the Hispid hare and it is not even known whether the young are born naked and blind, although they are known to burrow like rabbits.

T.C. Jerdon, writing in the 'Mammals Of India', published in 1874, wrote, 'The Pigmy hog is found in Nepal and Sikkim terai, probably extending into Assam and Bhutan, but it is very rare and procurable with difficulty'. As a matter of fact, Brain Hodgson heard of it for long before he was able to get a single specimen. This gives a very good idea of the status of the Pigmy hog for the last 150 years. The Pigmy hog has therefore been more or less extinct in the 20th century. On the other hand, E P. Gee, wrote in his book 'The Wild Life Of India' (1964), 'I have met sportsman who say they have seen it as recently as ten or twelve years ago, both east and west of Manas Sanctuary'. This statement is further enhanced by Mr. Richard Waller of the World Wild Life Fund, who toured India recently, and according to him it was generally believed that the population of the Pigmy hog was increasing, though the estimate was that only 15 to 20 existed in Assam.

According to Brain Hodgson, the Pigmy hog is partial to Sal (*Shorea robusta*) forests and the full grown male lives constantly with the herd which consists of from five to twenty individuals. They eat roots, bulbs etc., and at the same time bird's eggs, insects and reptiles. The females have six mammae instead of the twelve in other pigs, and have a litter of three to four piglets.

The herd of the Pigmy hogs, recently captured to the delight of conservationists, has a sex ratio of four males to thirteen females, and it is fervently hoped that this herd will act as a breeding pool should others not exist.

The King Cobra

By

S.R. CHAUDHURY

Nihar named her Jyoti. It was an eleven and a half feet female king cobra (*Naja hanna*), raw and sharp tempered with equally sharp fangs. We caught her at Mundhal, Landsdowne Division, U.P. on May 12, 1971. That was where we had been camping since May 9, with my students. Within a fortnight Jyoti became quite docile, almost a pet. She soon fell in line with our gypsy jaunts, curled up cosily in her basket on the back seat of my car. She went with us to Delhi. She had no trouble. The supposedly useless milk (for a snake) and presumably useful provitex mixed and siphoned down her gullet, kept her trim.

She was preparing to undertake a long trip with us—Corbett National Park, Nainital, Betla, Lucknow etc. etc.—the last tour of the trainees for the diploma course in Wildlife Management. After that we hoped to find a permanent good home for her. But she got it much sooner than that. On the day of our departure, I got a cable from my esteemed friend Reuben David, Superintendent, Ahmedabad Zoological Garden, offering a good home. When Nihar asked Jyoti if she would like to go, the reply was a big leisurely yawn, as if to say, “could perhaps reconcile myself to a person who would love me as much as you do”. We knew, she would get that—may be more—from Reuben. And so, she was escorted to Ahmedabad on June 1, 1971.

Many have asked me how I dared to catch an adult king cobra—supposed to be the most vicious and deadliest of all land snakes in the country—bare handed. It happened this way.

In the rush to cover the heavy syllabus for the course I was holding a theory class in the afternoon followed by the compilation of the data collected by each trainee during his individual field work—that same day. A little after 5 p.m.; Mahinder, the chowkidar who was sitting near my tent, about 150 metres away from the main camp, raised the alarm—“Banduk, banduk (meaning the gun), get the banduk. Call the sahib, a big snake is in his tent”. Guns we had, breach-loading 12 bore, double barrel, fortunately two, but with only blank cartridges to scare away elephants.

All started running at once, with no guns of course. I called out for a forked stick which evidently was not there, to deal with this surprise. In the rush Nihar handed me a stick. Within seconds all of us approached my tents.

It transpired on the post-incident analysis, that Mohinder, from his drowsy perch near the tent, saw the raised hood of that deadly snake barely three metres from him. Jyoti,

slithering towards the tent, had raised her head perhaps to have a better look with her glossy lidless eyes, or more precisely to get a wider perception with her forked smell-gathering tongue darting in and out, thrice every two seconds. That sight was enough to trigger the alarm and the auto-controlled pandemonium that followed. Every one was keen to have a close look at this rare reptile in its free state. But all were restrained by the inherent dread of a king cobra.

"There, there in the sot (Sandy wide stream)", together, all exclaimed in one voice and then all was a shuffle of many feet, followed by silence.

After feeling, Mahinder's alarm as he perhaps understandably made a bee-line for safety in the crowd, the king cobra had moved towards the sot, close by my tent. We saw her gliding fairly fast over the dry sand, tail chasing the head in a wagging course that left a wide smoothened trail of a faint zig-zag.

When she found that I was fast gaining on her, she made a sharp turn and came for me with all the viciousness that a king cobra is worthy of, Things then happened in less than three seconds.

I stepped backwards to avoid the strike. And, as I did so, my left heel caught a small boulder. Lucky that Nihar had given me the stick. As I fell backwards my left hand broke the fall. I moved the stick to my right hand to ward off those deadly fangs. The stick caught the snake at the nape of the neck and deflected the head. I jumped up, moved forward and threw away the stick. Before Jyoti could attempt to strike again, I caught her behind the head, the thumb automatically moving into the lower jaw cleft to fix the bead. Nihar virtually pounced on the mid-ribs and all my students put their hands on to every available space on that wriggling body. Allow that snake to put a coil and knot on any part of the body, and you are done for. It will soon start pulling backwards with enough strength to wriggle out. This is what one has to prevent with a large poisonous snake.

We marched back in a rope-holding single file. At the camp I asked for a scalpel, pincers and some potash. I changed the grip from my right to the left hand and with the left thumb in the lower jaw cleft, a slight sideways movement of the thumb exposed one side of the upper jaw. I lifted the fang and the student, with the pincers broke it off. The thick colourless venom oozed out due to the pressure of my grip over the poison sack behind the eye. Then the fang on the other side was taken out. Poison and fangs thus collected were put in a vessel for oxidation with potash. When I opened the paper packets I found it was not the potassium permanganate which I had asked for but the insect-killing tube containing potassium cyanide. Such things are prone to happen in an overstrung anxious crowd.

Jyoti remained with us for 20 days. She is now in Ahmedabad Zoo. We often remember her and still wonder how was it that a king cobra with its reputed speed and viciousness could not press home her advantage ?

Letters to the Editor

I

Dear Sir,

Ref: Mr. K.S. Sankhala's letter appearing at page 61 of Vol. 13, No. 2 of CHEETAL

If an opinion on Wildlife.....tiger in this casewith which we strongly differ, was printed and circulated in and outside this country, it was expedient that we should state our views.

The core of all the 'point by point' arguments in Mr. Imam's open letter J'ACCUSE was "the under privileged jungle villager .. human beings (and) cattle versus tigers and the (supposedly) resultant loss of Rs. 60 million worth of cattle".

My comments are focused, with rational field support.....that of the jungle villager's actual experiencemainly on that core; and avoids diffusion.

I do not agree that Mr. Imam's open letter did not merit any consideration.

Camp Delhi
July 10, 1971.

Yours Sincerely,
(S.R. Choudhary)

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Dear Sir,

Ref: Mr. G.U. Kurup's article on "A Preliminary Ecological Survey of the Periyar Wildlife Sanctuary, Kerala State... ..pp 5 to 8 in CHEETAL, Vol. 13, No. 2.

There are some contradictions in the observations, assessments, assumption and projections on which the article is based. I mention a few.

1. Evaluation of the population properties of the elephants is sketchy, and inferences based on preconceived notions. 1.1—What are the morpho-details to differentiate, 12 years from 11, 10, 9 even 8? Why 12 years? Why 20 to 25 years age structure? Nothing is known. And then to state, "..... the species in India is facing a population crash", not scientific. 1.2.—what are the signs and symptoms in the range? Do they objectively show such deterioration due to overuse by elephants, that it can be said that there is an excessive increase in population density? 1.3.—Homeostatic mechanism? If this is readily manifested in elephants how then was the population problem in the Tsavo National Park in Kenya? 1.4.—it would be better by far to state precisely the observed facts and avoid bias in observations, determine the priorities for objective studies. 1.5.—under the present condition of lack of knowledge and data it would be more reliable to keep a watch on the trend of herds below 1 to 1.5 M and 1.5 to 2 M height classes in the population separately, and for the sanctuary as a whole, to make a dependable and intelligent guess about the future.

2. Synecological relationship between elephants and gaur in the same range has been confused.

3. All that was written about wild dogs has to be carefully evaluated. One pack of 100 to 150 wild dogs would need around 3 to 5 cheetals a day. What could have been the trend in success ratio in predation when the cheetal got rarer? How about the same homeostatic mechanism, which should be manifested to a greater extent in predators? Table 3 proves the fallacy.... 'wild dogs abundant' and all their possible prey except barking deer, rare. How did any pack live to swim across to the island? Who saw it? Replantations have failed else-where due to many reasons. Who kept a watch of the causes here?

Besides the above, my main objection to the points raised by Mr. Kurup is on his proposal for future projects in Periyar. There are as follows:—

A. Wild dogs

AA. What is that 'healthy level' of reduction in population?

BB. How will anyone do it with these elusive animals? Have drives over 777 Sq. kms. of forests including evergreen types? What chances for success? What cost?

CC. Would not the residual dogs continue to breed and thus recreate the problem latter.

DD. The remedy lies not in a head-long plunge into this fancy project with prohibitive cost and uncertain results. Reduction may be incidental. The actual approach should be to evaluate and rationally visualise the reason why wild dogs here are a problem at all.....if the suspicion is correctwhen they are not so elsewhere in similar habitats and synecological conditions.

B. Re-introduction of Cheetal

This should not be done without first assessing the actual factors and influences that caused their disappearance and simultaneously the cause in ADD. above.

C. Dry land swamp deer (Sub-species)

AA. There are less than 100 animals of this threatened sub-species (*brandisii*) in Kanha National Park (M.P.). The future of this sub-species in Kanha itself is uncertain. Six are all that could be risked for capture and inclosed study in Kanha.

BB. Could we be so foolish as to translocate a sizeable portion (viable) of a herd that it should have a fair chance of success far from the dwindling population in Kanha?

CC. Experiment with a threatened species?

D. Buffer species

AA. Table 3.....blacknaped hare.....occasional. Evidently environmental resistance limits this hare in Periyar.

BB. The project plans it appears, to pen-breed, and release, keep on doing this ? What costs again ?

CC. Can anybody imagine how many of those small rodents will be required to divert the attention of the wild dogs from their natural prey animals, the cheetal, sambar etc. ? Hundreds of thousands perhaps; so that the hares are so many and so ubiquitous that the wild dogs may wax fat on those easy catchesenough for each in packswithout the hard labour of getting a cheetal. And then those dogs will breed fast, and also the rodents.

DD. There is a greater inherent behavioral sequence to such a proposition. Those numerous rodents will eat up the tender and succulent parts of the grass and forbs, waste the remaining and soon clean the range of most of its ground fodder. The result will be starvation and decimation of those ungulates for which then hares are supposed to act as buffers against the wild dogs.

4. When I asked my students to comment on Mr. Kurup's proposals, everyone present said, "Good proposal". And that is what many would say without thinking and unable to visualise the future consequences.

Your's Sincerely,
S.R. Chaudhary.

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III

Extract from a letter from Mr. P.D. Stracey to Mr. C.W. Holloway, Secretary, Survival Service Commission, I.U.C.N. & N.R. (Mr. Stracey is at present on an assignment as adviser-Consultant to the Ethiopian wildlife Conservation Department, Addis Ababa.)

I have received the notice of the 37th meeting of the Survival Service Commission for the 2nd and 3rd of April and much as I would have liked to attend, even in my private capacity, circumstances do not permit this. However, I am sending you something on the Tiger which may be of interest to the meeting. There has, as you know, been a certain amount of opposition to the ban on the hunting of the tiger in India, particularly from one or two professional hunters. You will have also probably seen an open letter from one Mr. A. Imam to the Prime Minister of India in the Cheetal, Journal of the Wild Life Preservation Society of India, for October 1970.

If I may be permitted, at this distance and away from the scene of the tiger, to comment on Mr. Imam's letter, it might be of some use to the forthcoming meeting in case the subject is discussed. Mr. Imam stresses the fact of *loss* to the jungle dweller through the killing of his cattle by tiger. He has fixed a value of Rs. 200 on the average per domestic

animal killed and the total loss to the jungle villager as Rs. 10,000 per annum. I feel that Mr. Imam has completely missed the point that the average jungle dweller places no specific value on his cattle, which are literally running wild and breeding in an uncontrolled manner, and that he takes his losses, both by way of kills through carnivora and deaths through starvation and malnutrition, as part of the facts of his existence. It may best as well be argued, on the other hand, that the tiger performs a useful work in keeping down the numbers of half starved and decrepit cattle roaming the areas where it is found, and that in doing so it assists the forester and, indirectly, the agriculturist by reducing the cattle pressure on the land. I am personally aware of what a good 'guardian' the tiger really is to a forest by keeping down grazing cattle.

Mr. Imam has referred to the Indian Wild Life Board's estimate of 500 tigers for Assam (including Meghalaya) as a great underestimate. He states that this estimate is only for the Government Reserved Forests and argues that the Tribal Council Forests and Grazing Reserves in Assam and Meghalaya would support another 500 tigers, and that N.E.F.A., Nagaland, Manipur and Tripura which he states have not been considered at all must at least support a thousand tigers. He talks of the adjoining Bhutan and Burmese territories as having another 1000 tigers, and therefore concludes that the total tiger population of the N.E. Indian region must be at least 3,000 tigers, thus putting the Indian Wild Life Board's figures in error by 2,500 tigers.

As one who spent 25 years in Assam in the Forest Department, and who was both a tiger hunter as well as a tiger conservationist, and also because of the fact that I have seen Bhutan, N.E.F.A., Nagaland, Manipur, Tripura and the fringes of upper Burma, I can confidently say that much of the territory indicated by Mr. Imam is not really tiger country, and therefore the population of the Assam 'region' tigers could by no means be compared to that of the U.P. and Nepal Terai, as well as the areas where Mr. Imam has killed so many tigers, the Goalpara and Tezpur areas of Assam, i.e. grasslands.

In Assam the tiger is much less in numbers than in the drier tracts of India and the grassy submontane tracts of the Himalayas, because of the moist evergreen forests which characterise most of the areas of northeastern India. In this respect Mr. Imam's assumption regarding 10% of India's population of 55 million people living in jungle areas where "the tiger is their traditional enemy" is wide of the mark in that there are very many forests which do not contain tiger at all. One other point in which Mr. Imam is wrong on the northeastern Indian position is that they capture as many as 1000 wild elephants a year: I am sure the figure is nearer 300 these days. I am probably the last man who captured five hundred odd elephants a year for two successive years, and that was 35 years ago!

When Mr. Imam says that "The world tiger population is hardly in danger" he is being extremely optimistic. When I wrote my book "Tigers" for the World of Animals Series

published by Arthur Barker of London (Weidenfeld and Nicholson), I made enquiries of all the countries where the tiger is said to be found and had replies from even countries like Korea. The picture was extremely dismal indeed and revealed that the tiger was practically on its last legs in such countries as Indonesia, Korea, and Iran. What the position must be in Indo China after so many years of war and bombing and destruction of the habitat must be left to imagination. It was this fact that made me, at the discussions which we had in Delhi in 1969 on the tiger, throw in my weight on the side of a blanket ban on the destruction of the tiger throughout the world. When Mr. Peter Scott asked me what was my opinion I said that if it was a question of helping the tiger in these countries to survive I would not object to the tiger throughout the world, including India, being put in the Red Book list of endangered species.

My view still holds, but I must be honest to myself when I say that a blanket ban on legitimate hunting of the tiger in India for any prolonged period would not be entirely justified unless well conducted censuses of the animal revealed its threatened position. My own feeling, both as a forest department administrator and as a hunter in my time, is that unless we can simultaneously provide sufficient protection for the animal from *unlicensed* and *illegal* hunting, the creation of a vacuum in tiger habitat by excluding legitimate sportsmen may lead to very opposite results. There are, of course, other threats to tiger's existence, such as poisoning by crop protection chemicals and, of course, the destruction of tiger's natural prey species, the deer and the pig of the Indian jungles, and it is here that equal emphasis will have to be placed. Finally there is the threat of the 'almighty dollar' which is exemplified in the article headed "Death Factory for the Tigers," which I am sending you. Unless the Indian Board of Wild Life and the Government of India can live up to their promises to protect the tiger through control of export of its skin, much of the value of the good-intentioned ban on legitimate hunting of the tiger would be lost.

(There is, now, a total ban on export of skins from India).

केमीलियोन जीलानिकस का निरीक्षण

लेखक

हरीप्रकाश अग्रवाल, सोलन

रेंगने वाले जन्तु विश्व के लगभग सभी भागों में पाये जाते हैं, जो कि हर प्रकार के वातावरण में रहते हैं। ये जन्तु सबसे अधिक उष्णकटिबन्ध में पाये जाते हैं। इनमें शीत सहन करने की क्षमता बहुत कम होती है। इनकी केवल तीन जातियाँ उत्तर-ध्रुव प्रदेश में मिलती हैं, दक्षिण ध्रुव में कोई नहीं मिलती। ऊँचाई के वातावरण का सामना करने का शक्ति इनमें बहुत कम होती है और ऊँचे पर्वतीय हिस्सों में लगभग इनकी कोई जाति नहीं पाई जाती है।

रेंगने वाले जन्तुओं के वर्ग में बहुत अधिक विविधता पाई जाती है, जिसमें विविध प्रकार के जन्तुओं का समावेश है। केमीलियोन जीलानिकस उनमें से एक है। यह खण्ड स्क्वेमेटा, उप खण्ड सोरिया के अन्तर्गत केमीलियोनाईडी कुल से सम्बन्धित है।

केमीलियोन की लगभग आधी जातियाँ अफ्रीका में सहारा के दक्षिण में पाई जाती हैं और अन्य आधी जातियाँ समीपवर्ती मेडागास्कर के टापू में मिलती हैं। केवल चार जातियाँ दूसरे स्थानों पर मिलती हैं।—एक जाति भूमध्यसागर के दक्षिणी सिरे पर उत्तरी अफ्रीका से दक्षिणी स्पेन तक; दो जातियाँ अरब प्रायद्वीप के दक्षिण-पश्चिमी हिस्से में और एक जाति भारत व सीलोन में पाई जाती है।

यह खेतों व उद्यानों में, पेड़-पौधों व झाड़ियों पर रहता है। साधारण तथा यह पूरे वर्ष भर दिखाई देते हैं, परन्तु शरद-ऋतु में छिपना प्रारम्भ कर देते हैं और अधिक गतिशील नहीं रहते। इस छिपकली को विष-खोपड़ा भी कहते हैं व यह कहा जाता है कि इसके काटने से मनुष्य की मृत्यु भी हो जाती है।

केमीलियोन जिलानिकस के ध्यान देने योग्य तीन मुख्य पहलू हैं—एक तो भोजन सम्बन्धी स्वभाव, दूसरा उसके वृक्ष पर रहने का स्वभाव और तीसरा उसका अलंकरण या सजावट।

रेंगने वाले जन्तुओं में सबसे अधिक परिष्कृत शिकार करने का ढंग केमीलियोन में कीट-पतंगे फसाने वाली जिव्हा द्वारा पाया जाता है इसकी जीभ खोखली होती है और जब प्रयोग में नहीं होती तो इसका गुच्छा सा बन जाता है। यह जन्तु पक्का निशानेबाज होता है, इसके लिए वह जिव्हा का विचित्र ढंग से प्रयोग करता है। केवल केमीलियोन ही एक ऐसा जन्तु है जो कि अपनी जीभ को कुछ दूर तक बाहर फेंकता है और अपने शिकार को निशाना लगा कर तुरन्त शिकार सहित जीभ को अन्दर कर लेता है। जीभ की कुछ मासपेशियों के संकुचन द्वारा जीभ बाहर आती है। यदि यह जन्तु जमीन पर रहता तो इसकी जीभ ठीक प्रकार काम में नहीं आ सकती क्योंकि जमीन पर इसे बहुत सी अशुविधायें होती और इसकी लसलसी जीभ पर मिट्टी भी चिपक जाती। जीभ के मुगदर के आकार के सिरे पर एक चिपचिपा पदार्थ रहता है, जिसके द्वारा शिकार जीभ से चिपक जाता है। केमीलियोन जीलानिकस अधिकतर कीट-पतंगों और दूसरे छोटे जन्तुओं का भक्षण करता है। मेडागास्कर में पाई

जाने वाली जाति केमीलियो ओस्टालेटी चूहे का भी भक्षण कर लेता है; केमीलियो सेलेरी चिड़ियों को भी खाता है। परन्तु केमीलियोन की जीभ गीले पदार्थों को नहीं पकड़ सकती।

खाद्य पदार्थ तक की दूरी केवल उसके आकार द्वारा ही ज्ञात नहीं होती, वरन् दूरी का अनुमान लगाने के लिये हमको दोनों नेत्रों का प्रयोग करना पड़ता है। एक केमीलियोन भी यद्यपि इसी आधार पर निर्भर रहता है, परन्तु वह अपने त्रिविम दृश्य को और अधिक सही व ठीक बनाने के लिये अपने शरीर के अग्र भाग को दोलन करता है जिसके फलस्वरूप वह अपने शिकार की बहुत सी दिशाओं व कोणों से देख सकता है।

इस जन्तु में खाद्य पदार्थ पकड़ने के लिये एक अच्छी दृष्टि बनाने के साथ साथ यह विशेषता है कि इसके नेत्र बहुत विलक्षण होते हैं। इसके नेत्र काफी बड़े व उभरे रहते हैं, जो कि मोटे पलकों से ढके रहते हैं—केवल एक सूक्ष्म भाग खुला रहता है। इसके नेत्र आगे, पीछे ऊपर व नीचे अपनी पूरी गोलाई में घूम सकते हैं: और विशेष बात यह कि प्रत्येक नेत्र बिना दूसरे नेत्र पर निर्भर रहे स्वतन्त्रता पूर्वक घूम सकता है।

अनुमान कीजिये एक टिड्डा केमीलियोन के पिंजड़े में रखा गया। इस समय उसका पृष्ठ भाग आपकी ओर है, परन्तु उसकी आँखें शृथुन की दिशा से 150° के कोण पर घूमकर आपकी तरफ लगी हुई हैं। इस समय टिड्डे की सूक्ष्म गति ही केमीलियोन को आकर्षित कर लेती है तथा समीप वाली आँख घूमकर उसपर केन्द्रित हो जाती हैं, और दूसरी आँख आप पर केन्द्रित करते हुए, जन्तु टिड्डे से मुकाबला करने के लिए गति करता है। अन्त में जब उसका शक कम हो जाता है वह अपनी दूसरी आँख भी टिड्डे की ओर कर देता है और शिकार के लिये आगे बढ़ता है।

यह एक रोचक जन्तु है। इसका कारण रंग परिवर्तन स्वभाव है। रंग परिवर्तन भावावेश के फलस्वरूप भी होता है और दूसरे केमीलियोन से लड़ाई में जीत या हारने पर त्वचा का रंग पीला-हरा हो जाता है जबकि कत्थई रंग अच्छा छलावरण हो सकता है या कत्थई रंग हो जाता है जबकि पीला-हरा रंग बेहतर सिद्ध हो सकता है।

स्वरक्षा या बचाव का सम्पूर्ण विषय छलावरण से लेकर विडम्बना या धोखे-बाजी तक इतना विस्तृत है कि इस बारे में एक पुस्तक लिखी जा सकती है। केवल रँगने वाले जन्तुओं में ही बहुत से ऐसे उदाहरण हैं जिनमें बचाव के लिये रुपान्तरण होता है—ये सब जन्तु के जीवित रहने में मदद करती हैं। ये दूसरे प्रकार के प्रमाण हैं जिनसे ज्ञात होता है कि प्राकृतिक-वास रहने के स्थान से अधिक आवश्यक है, और कोई भी जन्तु अकेला नहीं रहता।

केमीलियोन जीलानिकस की त्वचा में रंग परिवर्तन देखने के लिये कुछ प्रयोग किये गये। जबकि उसके वातावरण का तापक्रम अधिक कर दिया गया, उस समय उसकी त्वचा पर गहरे व पीले रंग की आड़ी धारियाँ या पट्टियाँ दिखाई पड़ने लगीं जिनपर काले बिन्दु के समान धब्बे बिखरे हुए थे, परन्तु जब तापक्रम कम कर दिया गया तब पीली धारियाँ हलके हरे पीले रंग में परिवर्तन हो गईं। इस जन्तु को एक बड़े काँच के जार में रखकर, चारों ओर से उसे काले कपड़े से ढक दिया, उस समय यह देखा गया कि त्वचा में गहरे व पीले रंग की धारियों पर काले धब्बे बहुत अधिक संख्या में फैल गये। जब इसको सूर्य या विद्युत के प्रकाश में रखा गया, इसकी त्वचा का हल्का पीला रंग हो गया। जब इस जार को पीले कागज से ढक दिया गया उस समय गहरी पीली धारियाँ

दृष्टिगोचर होने लगीं। जबकि लाल रंग का कागज जार पर चिपका दिया गया, उसके १० मिनट पश्चात् भूरे रंग की आड़ी पट्टीयाँ दिखाई दीं जिन पर कि सूक्ष्म काले बिन्दु बिखरे हुये थे। जब इस जन्तु को हरे रंग के वातावरण में रखा गया तो इस जन्तु का रंग हरा हो गया। इसकी त्वचा के रंग में परिवर्तन इसकी आँखों को बन्द करके भी देखा गया। ऐसा करने के लिये इसकी आँखें ड्रापर की रबर द्वारा बन्द कर दी गईं, इसके १५ मिनट पश्चात् यह निरीक्षण किया गया कि त्वचा का रंग उसी प्रकार परिवर्तन होता है जिस समय कि उसको काले वातावरण में रखा गया। भूसे के रंग की कुछ मकड़ियाँ व टिड्डे जार में रखे गये तो केमिलियम ने त्वचा का रंग हल्के पीले रंग में बदल दिया, जिसपर कि कहीं कहीं सूक्ष्म काले बिन्दु बिखरे हुए थे, परन्तु जब जार में केवल हरे रंग के ही टिड्डे रखे गये तो इस जन्तु की त्वचा का रंग बिल्कुल टिड्डों के रंग के समान हो गया। यह भी देखा गया कि जब यह जन्तु कुछ देर तक भूखा रखा गया तो इसकी त्वचा का रंग विभिन्न रंगों में जल्दी जल्दी बदलने लगा।

यह विचारणीय विषय है कि यह छिपकली (केमिलियम जीलानिकस) किस प्रकार पेड़-पौधों पर चढ़ता-उतरता है और किस प्रकार बैठता-उठता है? यह प्रश्न हमको इसके दूसरे अनुकूलन का विचार कराता है—यानि कि इसका वृक्ष पर रहने का स्वभाव। छिपकली के कुल में यह देखा गया है कि उसके पैरों में दो मूल रूपान्तरण होते हैं—१) शक्तिशाली पंजे, २) गद्देदार उंगली। परन्तु केमिलियम में अपनी विचित्र विशेषता है। प्रत्येक पैर में उंगली दो दो में जुड़ी रहती हैं। अगले पैर में दो उंगलियाँ बाहर की ओर और तीन अन्दर की ओर एवं पिछले पैर में तीन बाहर की ओर। प्रत्येक उंगली के केवल अन्तिम सन्धियाँ और पंजे अलग रहते हैं। इस प्रकार पैर, पकड़ने की चिमटी के रूप में परिवर्तित हो जाते हैं जो कि शरीर को सहारा देने में काफी शक्तिशाली होते हैं जबकि केवल पिछले पैर प्रयोग में होते हैं। पकड़ने व चढ़ने की क्रिया में मजबूत परिग्रही दुम भी योगदान देती है। यही नहीं, इसकी दुम डाली आदि से अच्छी प्रकार से लिपटी रहती है।

जिस समय एक भूखा केमिलियम किसी खाद्य पदार्थ की ओर धीरे धीरे जाता है वह अपने आपको इस प्रकार छिपाता है कि पेड़ पत्तियों में उसका पता नहीं चलता। केमिलियम एक पत्ती के आकार के समान हो जाता है। इसका सम्पीडित शरीर पत्ती के आकार से बहुत समानता रखता है एवं उसके चलने से जो उसमें गति होती है उस समय ऐसा प्रतीत होता है कि हवा से पत्ती हिल रही हो।

केमिलियम का विचित्र अलंकरण या तो केवल नर में ही पाया जाता है और या नर में भली प्रकार से विकसित होता है उदाहरणार्थ—सींग केवल नर में ही पाये जाते हैं। इससे यह विश्वास प्रकट होता है कि नर उन्हें लड़ने भगड़ने में प्रयोग में लाते हैं, परन्तु उनके इस स्वभाव को हम चुनौती देना कह सकते हैं क्योंकि शायद ही कभी वे शारीरिक स्पर्श करते हों। नर केमिलियम दूसरे केमिलियम को धोखा देने का प्रयास करता है ऐसा करने के लिये वह शरीर को हवा से फुला लेता है, गला भी उभर आता है, मुँह थोड़ा सा खुल जाता है और दूसरे नर केमिलियम के सामने आड़ा हो जाता है, जिससे उसके आकार का अतिशयोक्तिपूर्ण अनुमान लगता है।

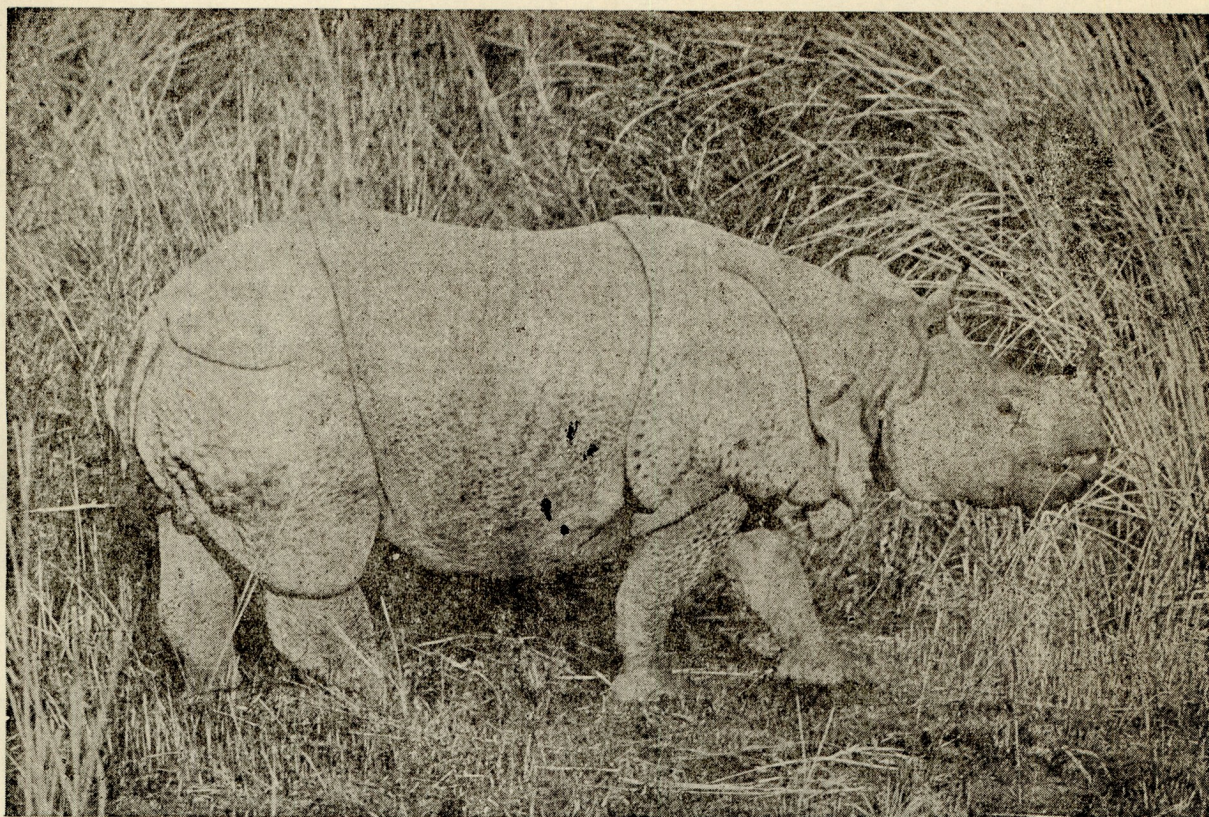
नर केमिलियम अपनी सीमा निर्धारित करने का प्रयास करते हैं, इसके द्वारा वे अपने आप को दूसरे नर से अलग रखते हैं। यह स्वभाव उस समय भी देखा गया है जबकि बहुत से नर एक ही पिंजड़े में रख दिये जायें।

अपनी घूमने वाली आँखों द्वारा सीमा की निगरानी करना सरल हो जाता है। परन्तु यह दिलचस्प बात है कि मादा केमीलियोन नर की सीमा में स्वतन्त्रता पूर्वक विचरण कर सकती है; अन्यथा जाति में प्रजनन होना असम्भव था।

केमीलियोन की यह जाति अण्डप्रजक है और मादा के लिये यह एक समस्या की बात है क्योंकि इस कार्य के लिये उसे वृक्ष झाड़ी छोड़ कर नीचे जमीन पर आना पड़ता है। अण्ड देने के समय मादा केमीलियोन जीलानिकस झाड़ी को छोड़ देती है और जमीन पर आकर गड्ढा खोदती है। यह देखा गया कि मादा केमीलियोन अपने अगले पैरों द्वारा जमीन खोदती है तथा पिछले पैरों द्वारा मिट्टी को पीछे की ओर फेंकती है। अण्ड देने के पश्चात् मादा अपने अगले पैरों द्वारा मिट्टी को गड्ढे में भर देती है और पिछले पैरों द्वारा उसको पाट देती है। एक मादा को यह कार्य सम्पन्न करने के लिये तीन दिन का समय लगा। क्योंकि केमीलियोन एक दिनचर जन्तु है—इस कारण यह केवल दिन में ही कार्य करती तथा प्रत्येक रात्रि में झाड़ी पर चढ़ जाती थी। इसके अण्ड का आकार लगभग आधा इंच मापा गया।

नवजात केमीलियोन चिपकनी भिल्ली में रहता है जो कि टहनी आदि के सम्पर्क में आने से चिपक जाता है। कुछ समय पश्चात् केमीलियोन भिल्ली से बाहर आ जाता है और फिर चारों ओर आँखें घुमाकर देखता है, तत्पश्चात् चिमटे जैसी टांगों व परिग्रही दुम द्वारा शाखा को पकड़कर अपने भविष्य का विचार करता है।

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